

MARINE REVIEW.

VOL. VII.

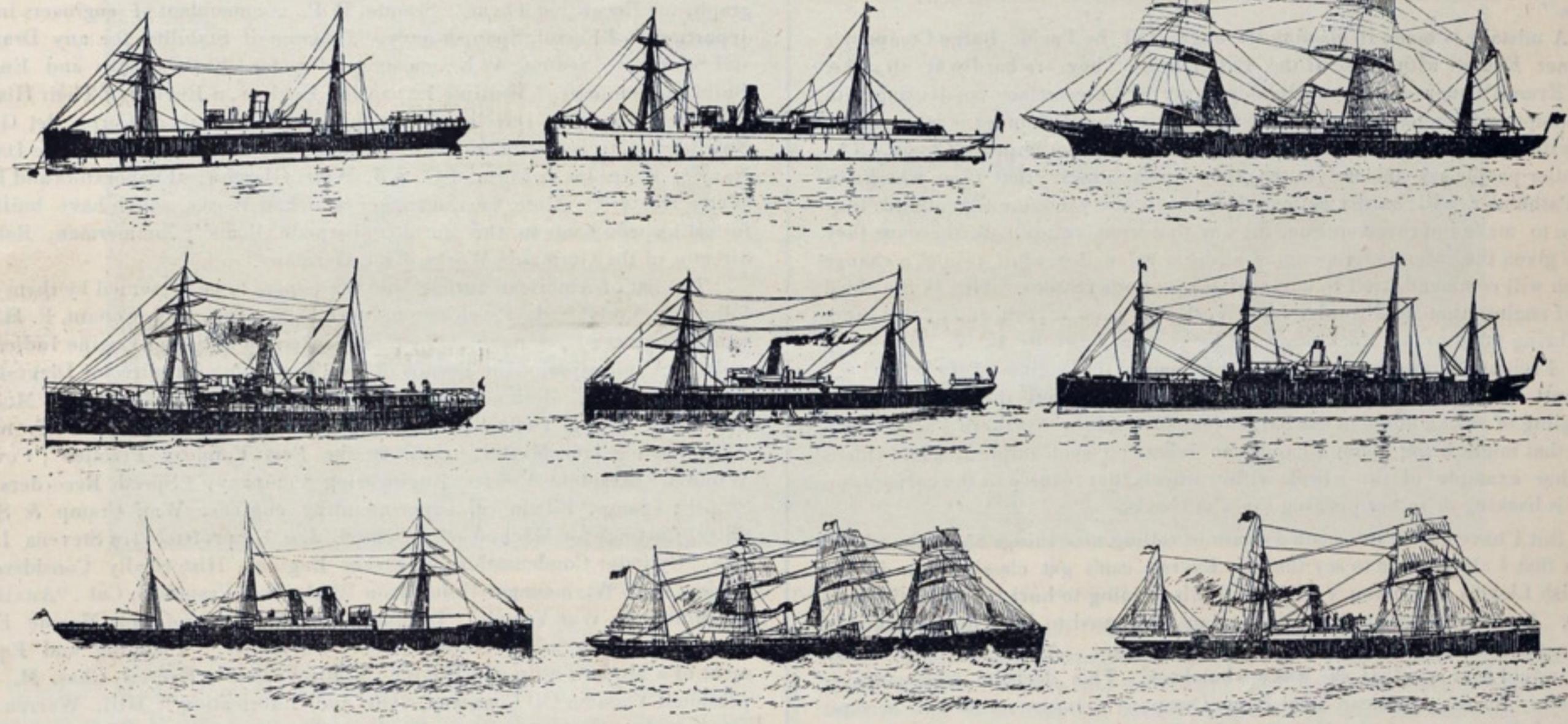
CLEVELAND, O., AND CHICAGO, ILL., JUNE 8, 1893.

No. 23.

Types of Ocean Going Cargo Steamers.

The engraving on this page, made up from various prints in English publications, illustrates how multifarious are the types of cargo steamers to be met with in crossing the high seas at the present day. It would be a long and tedious task to describe all of them, and they are not all shown in the picture. The very large class known as ocean tramps is first in the selection, but not most popular, as they are usually the shoddy of the ship yard. The next vessel is the well-decked steamer, a deadly species of ship, which must, perhaps, be held responsible for the drowning of more sailors than any other class of vessel that ever put to sea. But all of the cargo carrying ocean steamers are not by any means monsters of marine architecture. In the third picture we have a specimen of the graceful clipper-hulled steamers engaged in carrying wool from Australia and the Cape to

The western ocean cattle boat is chiefly a large powerful steamer, of a burthen ranging from 3,000 to 5,000 tons. Indeed, many of these vessels belong to the great immigrant carrying lines, and each voyage brings in a living freight consigned to Castle Garden. Two hundred head of cattle is an average cargo in such ships as that included in the group. If it comes to a question of speed, however, there are undoubtedly no faster steamships, the Atlantic greyhounds alone excepted, than those to be found running in the tea trade. The China clippers of the days of tacks and sheets were notoriously rapid sailors, and their modern successors are built to fully sustain the old traditions. The steam collier is another type of vessel which is, as a rule, seaworthy and powerful in the highest degree. She belongs to a class infinitely more numerous than any other species of merchant steamer afloat.



TYPES OF OCEAN-GOING CARGO STEAMERS.

TYPICAL OCEAN TRAMP.
SPAR-DECKED STEAMER.
CHINA TEA STEAMER.

A WELL-DECKED STEAMER.
GRAIN STEAMER.
MODERN FRUIT STEAMER.

A WOOL STEAMER.
CATTLE BOAT.
A STEAM COLLIER.

England. There is perhaps no branch of the ocean commerce, the coal trade excepted, that employs so large a tonnage of steamships as the British wool imports. Of quite an opposite type to the well-decked boat, yet nearly as unpopular too in her way amongst sailors, is the spar-decked steamer. The chief danger of this type of vessel lies in her disastrous tendency to shift her cargo. Numbers of these unstable ships have been lost simply by the displacement of their freight throwing them over on their beam ends, from which posture their narrow proportions and excessive top-weight effectually prevent their recovering buoyancy. Another type, the grain cargo steamer, ends the list of dangerous ships. Appearances in the case of the grain cargo ship are deceitful. Her owner desires to have her carry something like double the quantity of that of his neighbor, and she is built like a box with the lower corners rounded off for bilges.

Outside the great passenger liners, there are, however, countless very fine steamers trading to the various ports of the world, and the proportion of dangerous ships pictured here is probably a little larger than it should be in such a sketch.

Lake Freight Matters.

Although leading bankers claim to see indications of a change for the better in the money market, the stringency in finances is now, and has been since the opening of the season of navigation, the main drawback in lake freights. Still it is generally believed that the present movement of grain out of Chicago, which has caused some advances in freights, is due to the banks refusing to give further support to the owners of the grain, who have been forced to let it go at reduced prices. Ore shippers say they can not follow a marked advance in grain freights, unless the money situation and the iron market show early improvement. They are, however, now paying going rates that are equal to the season contract figures. Sales of ore have been increased largely by the Illinois Steel Company and other big consumers making purchases, but there is, of course, a disadvantage in the fact that the prices are on the very low basis established at the opening. Soft coal shippers would undoubtedly be pleased to move more coal than is now going forward but they can not get banks to carry the paper of northwestern customers.

Gossip About McDougall—Engines Building at Detroit.

WESTERN OFFICE, MARINE REVIEW,
No. 701 Phoenix Building, CHICAGO, Ill., June 8.

Although nothing has been published about it, I have been told that Capt. McDougall is about ready to build for himself a palatial whaleback yacht, and that the engine, for which a contract was let recently, with the Frontier Iron Works, Detroit, is intended for this boat. The engine is to be 12 and 24 inches by 12 inches stroke, and will turn a small wheel 400 revolutions per minute. If revolutions were divided among twin screws, reports as to this machinery would sound better and possibly the boat wou'd ride more comfortably, but such is the story. Other details in the rumor add that the yacht is to be about 100 feet long and is expected to make 20 miles an hour. This is one of the first evidences of McDougall's wealth, acquired from judicious investment in real estate at the head of the lakes and from the whaleback gold mine. There is probably no man in the country today who has jumped into such close relations with monied men as this former lake captain, whose salary several years ago was not more than \$1,200 a year. He has applied his idea, or dream as it was called, to everything in practical navigation, and now it is said that he is going to give it the romance that belongs to a dream by building a fancy yacht. The trip of the Columbus from Duluth to Chicago was a triumphal cruise for McDougall, and as he walked through the cabins he probably thought of the week when he brought the 101 into Cleveland and dry-docked her for inspection. But she was ridiculed instead of being inspected, and in speaking of this occurrence several years later, when his plans for building whalebacks were backed by all the money needed and the investments had given good returns, he did not show signs of being "swelled up" over his good fortune, but evinced satisfaction in knowing that the ship builder who hurt him most was worrying as to "when he would stop building those cussed tanks."

A mistake is made in classing the engines of the Pacific Barge Company's steamer Everett with those of the Pathfinder. They are hardly at all alike. The Everett's engines are considerably larger and are surface condensing with all pumps and condenser independent, whereas the Pathfinder is jet condensing with pumps attached. Almost every detail has been improved upon. The Frontier people say themselves that they are well aware that those who know the Pathfinder will hardly believe this, but in every engine they build they strive to make improvements on the one that went before. In this case they have given the intermediate engine a piston valve instead of a slide, a change which will commend itself to engineers for various reasons. This is the third set of engines that the Frontier Iron Works has sent to salt water, the other two being fitted to the Mackinaw and Keweenaw, built by F. W. Wheeler & Co. Freight charges involved in the shipment of the engines of the whaleback Everett to Puget sound are probably very heavy, but then there is a comingling of stockholders in the barge company and the Northern Pacific Railway that might bring about a handsome rebate on such shipments, and this is another example of the wheels within wheels that revolve in the corporation that is backing or rather pushing the whalebacks.

But I have gotten into such a strain of telling nice things about the whaleback that I almost hate to say that the Everett can't get classification in the British Lloyd's or Bureau Veritas, and this is going to hurt her in getting cargoes. I understand that all possible means were used to have her classified in these old stand-bys, but the effort was of no account. About the only reason they would give was that she was a whaleback. This decision may make it necessary for the American Steel Barge Company to insure on its own account some of the cargoes of the Everett and other vessels that will follow her on coast. They stated, some time ago, that they would do this, if necessary, but it was then thought to be no more than a threat.

Mr. Livingstone of Detroit may have received \$15,000 each for the steamers Palmer and Livingstone, on account of forfeiture of contract on the part of the World's Fair Steamship Company, but judging from what he says a cipher lopped off that figure would be nearer the amount. F. M. B.

Naval Architects and Engineers to Meet in Chicago.

The meeting of naval architects and marine engineers in Chicago next month, in connection with the International Engineering Congress, will undoubtedly be the most successful gathering of its kind ever held in this country. The list of authors, which has just appeared in the Journal of the American Society of Naval Engineers, and which is printed below, includes the leading marine engineers and naval architects of the world. It has already been explained that the great assemblage of engineers at this congress, which will open on Monday, July 31, and end with Saturday, August 5, will be divided in the various branches or divisions covering all the fields of engineering except electrical, which is to have a special congress. In the division devoted to marine and naval engineering and naval architecture the list of foreign authors and papers are as follows:

Barnaby, Sir Nataniel, K. C. B., late director of naval construction, British navy, "The Best War Vessel"; Barnaby, S. W., with Thornycroft & Co., "Screw Propulsion"; Benbow, Henry, D. S. O., chief inspector of machinery, British navy, "Application of Forced Draft to Boiler Furnaces, its Effects in Causing Leaky Tubes, and the Remedies Therefor"; Biles, Prof. J. Harvard, professor naval architecture, University of Glasgow, designer of the

New York and Paris, "Fast Transatlantic Steamers"; Bol a, Casimiro De, inspector general of engineers, Spanish navy, "Rossin's Method of Graphical Integration Applied to Stability Calculations"; Busley, Carl, professor in Imperial German Naval Academy at Kiel, Germany, a marine engineering subject not yet stated; Denny, Archibald, partner in Wm. Denny & Bro., subject not yet stated; Elgar, Francis, L. L. D., consulting naval architect, 113 Cannon st., London, England, "The Present Position of the Science of Naval Architecture"; Foley, Nelson, manager Hawthorn Guppy Company of Naples, "Review of the Rules for Boiler Construction of the Various Governments and Registration Societies"; Haack, Herr R., late mechanical director of the Vulcan Ship Building Company at Stettin, Germany, "The Trireme at the Time of the Peloponnesian War"; Howden, James, engineer, designer of the forced draft system in use on the New York and Paris, and Teutonic and Majestic, "Forced Draft and Resistance of Ships"; Liddell, Arthur R., "Practical Stability Information"; Monsel, Robert, "Relation of Speed and Power in Steam Vessels"; Martell, Benj., chief surveyor of Lloyd's Register, "Naval Architecture in the United States"; Middendorf, Herr Fred L., technical director of the Germanischer Lloyd's, "On the Strength of Ships"; Migliardi, Signor G., late engineer officer in Italian navy, now of firm of Migliardi Bros., "Hydraulic Appliance in Connection with Modern Boiler Work"; Millar, W. J., secretary, Institution of Engineers and Shipbuilders in Scotland, "The Use of Oil at Sea"; Milton, J. T., chief engineer surveyor of Lloyd's Register, "Comparison of Machinery for Naval and Mercantile Vessels"; Poli, Rodolfo, of firm of Poli Brothers, Chioggia, Italy, "The Coastal Sailing Vessels of the Adriatic Sea"; Richin, Pro. W., professor at the Imperial Technical High School, Hanover, Germany, "The Resistance of Ships and Propelling Instruments"; Schlick, Consul O., agent of Bureau Veritas at Hamburg, "Vibration of Steamers, and His Apparatus, the Pallograph, for Recording Them"; Seaone, P. P., commandant of engineers in the department of Ferrol, Spanish navy, "Diagram of Stability for any Draught and Stowage"; Seaton, A. E., managing director, Earle's Ship and Engine Building Company, "Multiple Expansion Engines, a Review of Their History and Their Probable Development"; Soliani, Col. Nabor, Corpo del Genio Navale, Italian navy, "The Use of Liquid Fuel on the Vessels of the Italian Navy"; Weir, Jas., of firm of G. & J. Weir, Glasgow, "Evaporators and Feed Water Heaters"; Ziese, Carl, manager Schichau Works, which have built the fastest torpedo boats in the world, "Torpedo Boats"; Zimmerman, Robert, director of the Germania Works, Kiel, Germany.

The list of American authors and the papers to be presented by them is as follows: Ayres, S. L. P., chief engineer U. S. navy, and Conant, F. H., assistant engineer U. S. navy, "The Standardization of Steam Engine Indicators and the Application of the Results in the Correction of Indirect Diagrams"; Beavor-Webb, J., designer of the yachts Galatea and Genesta, "Modern Steam and Sailing Yachts"; Chasmar, Jas. H., chief engineer U. S. navy, "The Various Iron Mixtures Used in the Best Foundry Practice"; Cowles, William, president Cowles Engineering Company, "Speed Recorders for Ships"; Cramp, Edwin S., superintending engineer Wm. Cramp & Sons, "Steel Castings for Machinery"; Denton, Jas. E., professor in Stevens Institute, "Cylinder Condensation in Steam Engines, Historically Considered"; Dickie, Geo. W., manager Union Iron Works, San Francisco, Cal., "Auxiliary Machinery on War Vessels"; Durand, Prof. W. F., professor Marine Engineering and naval architecture, Cornell University, "Planning and Equipment of a Modern Ship and Engine Building Plant"; Everest, Chas. M., vice president Vacuum Oil Company, "Oils and Lubrication"; Hill, Warren E., vice president Continental Iron Works, "The Strength of Welded Seams"; Hollis, Ira N., past assistant engineer, U. S. navy, assistant to engineer-in-chief, "Problems Confronting the Designer of Naval Machinery and the Success which has been Attained in their Solution"; Howard, Jas. E., engineer of tests, Watertown arsenal, "Standard Form of Test Piece for Material Used in Connection with Marine Machinery"; Isherwood, B. F., chief engineer U. S. navy, "The Steam Jacket, its Genesis, its Principle of Action and its Limitations"; McDougall, Alex., inventor of the whaleback system of hulls, "Whaleback Steamers"; Miller, Walter, superintending engineer Globe Iron Works Company, Cleveland, O., "The Steam Shipping of the Great Lakes"; Nixon, Lewis, superintending naval architect, Wm. Cramp & Sons, Philadelphia, "The New Battle Ships and Cruisers of the U. S. navy"; Rogers, Archibald, "Ice Yachts"; Smith, David, chief engineer U. S. navy, "A Standard Steam Engine Indicator and the Necessity Therefor"; Stratton, E. Platt, chief engineer surveyor to Record of American and Foreign Shipping, "The Government Inspection of Merchant Steamers, and the Influence Thereon of the Rules of the Registration Societies"; Sweeney, John M., "Light Draught Steamers in Use on the Western Rivers of the United States"; Taylor, Stevenson, vice president and general manager A. & W. Fletcher Company, "Modern American Side-Wheel Steamers"; Towne, N. P., chief engineer U. S. navy and consulting engineer to the Wm. Cramp & Sons Ship and Engine Building Company, Philadelphia, Pa., "Valves and Valve Gears for High Speed Engines"; Ward, Charles, builder of the tubulous boilers of the U. S. S. Monterey, "Tubulous Boilers"; Weaver, W. D., electrical engineer, formerly of engineer corps U. S. navy, "Speed and Revolution Recorder for Measured Mile Trials"; Wilson, A. A., superintending engineer Quintard Iron Works, New York, "Hydraulic Machinery for War Vessels."

There will be an opening general session of the congress at 10 o'clock on

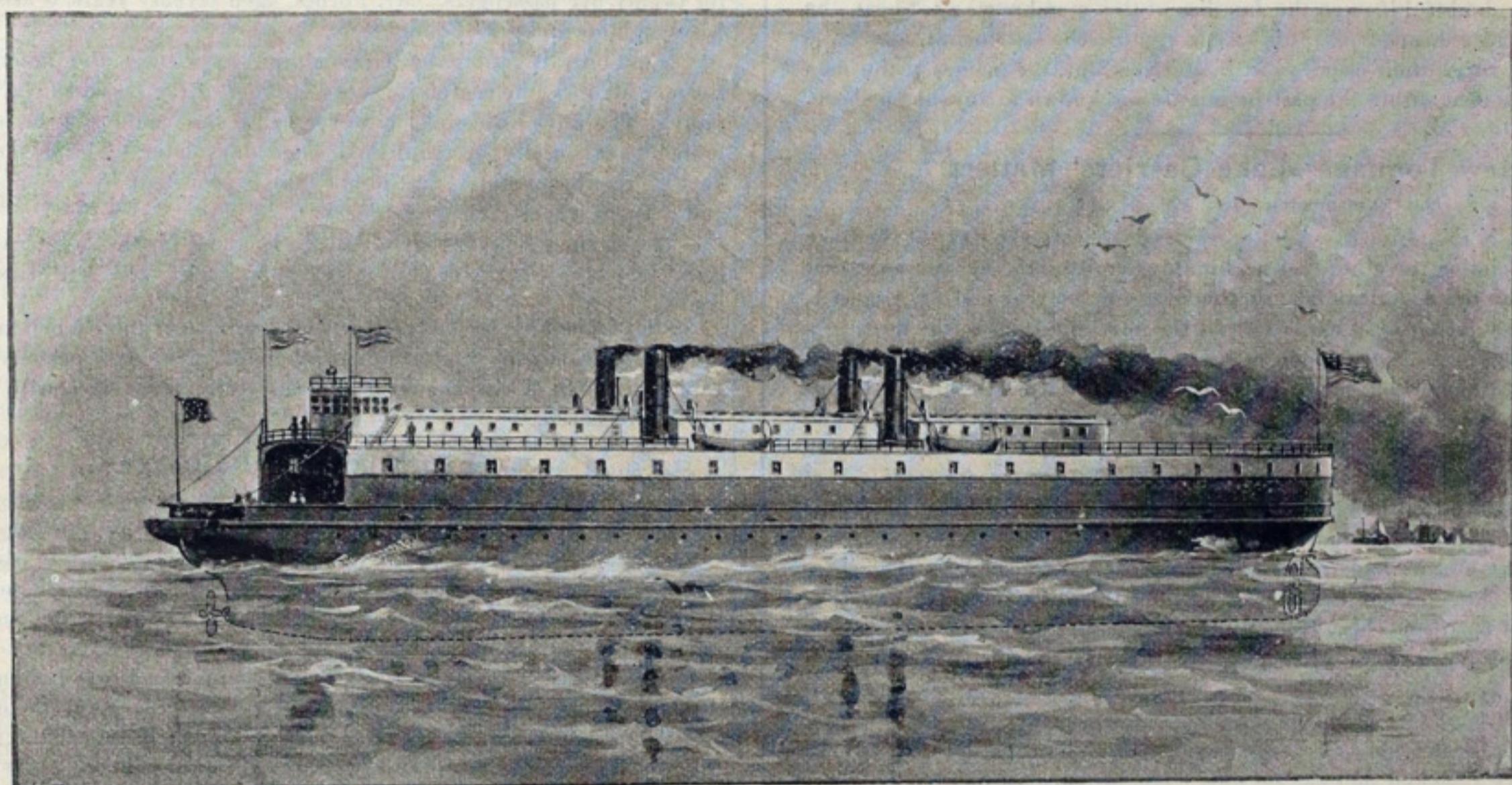
Monday, July 31, in one of the large halls of the Art Palace in the Lake Front park in Chicago. This is in the business or down-town part of the city and not at the exposition grounds. After appropriate addresses the divisions will be convened in their respective session rooms in the same building. Opportunities will be given for the display of wall diagrams and of stereopticon (magic lantern views) in illustration of papers. It is intended that all papers printed by the divisions shall be in English. Papers may be offered in French, Spanish, German and other languages, and, if accepted, will be translated and printed in English. Discussions may be in any of the three languages mentioned, and interpreters will be provided whenever necessary.

A daily programme will be issued each morning by the general committee, stating the order of papers and proceedings, so that engineers in attendance may select the sessions at which they prefer to be present. The programme will indicate the rules to be followed, and, as far as practicable, the speakers who are to take part in the discussions. There will be five morning sessions of the divisions, some of which may be joint sessions, and the congress will terminate with a general morning session on Saturday, August 5, on which day there will be no divisional sessions. The afternoons may be devoted to further sittings or to visits to the exposition or other points of engineering interest, as may be determined by the divisions. It is expected that the evenings will be given up to receptions and social intercourse.

cars, and this would cause the boat to roll heavily in a seaway but for the tanks between decks. There are two of these tanks and each has capacity for between 10,000 and 12,000 gallons of water, one being 37 feet and the other 34 feet long. These are filled about half full of water. When the boat rolls to port this water follows slowly and passes to the port side, and when the boat is again heeled to starboard there is a resistance, which tends to steady the motion, in the weight of nearly 10,000 gallons of water, which amounts to about 42 tons. The upper deck is devoted to crew's quarters, excepting two halls for passengers. The accommodations for the crew are roomier and more comfortable than in any other boat on the lakes. With the St. Ignace and Sante Marie in service at the Straits, under the command of Commodore Boynton, nothing should go wrong at Mackinaw.

Fire Loss from an Electric Plant.

EDITOR MARINE REVIEW:—As the agents of underwriters who insured the oats cargo of the steamer Selwyn Eddy can not take the chances of incurring the ill will of either the owners of the vessel or of the cargo, who have considerable insurance to place throughout a season, the loss of about \$10,000 through fire resulting from the steamer's electric light plant will be paid, if in fact it has not already been settled without hesitancy. This loss, which is



CAR FERRY SANTE MARIE, FOR SERVICE IN STRAITS OF MACKINAC.

Most Powerful Boat on the Lakes.

Special Correspondence to the MARINE REVIEW.

DETROIT, MICH., June 8.—The wonderful car ferry Sante Marie, recently completed by the Detroit Dry Dock Company for the Mackinac Transportation Company, consisting of the Michigan Central, the South Shore and the Grand Rapids and Indiana railways, will get away from here this week. She is by far the largest wooden boat on the lakes, and if we consider her beam, which is 5 feet more than that of any steel boat on the lakes, she lacks but little of being as large as the greatest of steel vessels on the lakes. Her engines are the most powerful on these waters, as they are expected to develop 4,000 horse power. This will drive the massive hull 15 miles an hour. The distance from St. Ignace to Mackinaw City being but 14 miles, the transfer of a whole train across the straits will occupy little more than an hour, giving as rapid ferry service as is known in the country.

The dimensions of hull and machinery are: Hull—302 feet over all, 269½ feet keel, 50½ feet beam and 24 feet deep. Machinery—Forward engine, compound, 28 and 52 inches by 40 inches; after engine, compound, 32 and 58 inches by 48 inches. Boilers—Four, 11½ by 18 feet, carrying 120 pounds steam. Wheels—Forward wheel 10½ feet; after wheel 12 feet. The forward wheel is for the purpose of breaking ice. In addition to the main engines, there are twenty auxiliary engines, among which is the Westinghouse engine that drives the dynamo for 350 incandescent lights. The construction is the heaviest known outside of war vessels. Over 2,000,000 feet of oak was used in this boat, and the hull is plated from keel to water line with steel. The system of double frames and stringer keelsons makes a double hull, and the holes cut through for the deadlights show that the inside planking, frames and outside planking have a total thickness of at least 18 inches in the part of the hull where deadlights are used.

An interesting feature of the boat is the steadyng tanks. The weight of the cargo is raised nearly four feet above the main deck, through its being in

new to the lakes, should, however, be investigated more thoroughly than it has been, as it leaves unsettled a question that may result to the disadvantage of numerous other owners who have ships equipped with electric plants. It is said that an electrician has been with the Eddy since she came out and was aboard at the time of the accident. His statement as to the perfect working and safe wiring of the plant would prove interesting, as he would, no doubt, know as much as the Buffalo expert, whose report showed very little investigation and was by no means conclusive. It is not generally believed that an electric plant properly installed is liable to spontaneous combustion, but whether such is or is not the case, the truth should be known. If some companies do poor wiring and other companies charge more but do their wiring in a mechanical manner, the facts as to this side of the question would also be interesting.

K. J. LOWATT.

In connection with the foregoing communication, it may be added that the loss on the Eddy's cargo was about as stated, or to be exact, it was \$10,072.38, according to the report of the surveyors, Messrs. John Rice and B. F. Bruce, of Buffalo. In their report, a copy of which we have seen, the surveyors go no further into the cause of the accident than to reprint the statement of the electrical expert, which appeared in the REVIEW of May 25. On the strength of this statement they say: "This fire being incidental to the navigation of all vessels, and the damage coming already within the perils insured against, we therefore hold the steamer free from liability for damage to her cargo." An extract from the protest made by the captain of the steamer, which accompanies the report of the surveyors, says that smoke emanating from the cargo was noticed on the way down from Chicago, although it is claimed in the same document that the dynamo was not run from the time intervening between the loading of the vessel in Chicago and her arrival at Buffalo.—EN.

British charts of Lake Superior cover the entire north shore. We have them for sale at \$1.

No Money in the World's Fair Traffic.

WESTERN OFFICE, MARINE REVIEW,
No. 701 Phoenix Building, CHICAGO, Ill., June 8.

Up to the early part of this week the passenger business from the city to the world's fair grounds was a losing venture for those engaged in it. During the cold, disagreeable days of the past month boats have not paid their fuel bills, much less the other expenses. The business this week has been better, however, and the look of gloom which has characterized excursion steamboat men is beginning to disappear. It is really remarkable what a number of boats are being chartered by people who think there is money in excursions to the fair grounds and points along the north shore. A steamboat man has placed the number at over sixty, and this seems to be an inside figure. Of course the world's fair will take up the greater number, nearly forty being scheduled to land at piers at Jackson park, or on either side. The north pier at the fair grounds, which was built for use of steamboats outside the Henry syndicate, has never been tied up to except by an occasional yacht. The exposition authorities imposed a tax of 10 cents a head for all persons who should land or depart from the pier and the steamboats could not afford this heavy fee. As the yachts are on the free list as invited guests, the pier is very convenient for them.

Again a schooner has been sunk with all on board, and with the exception of the captain, who was comparatively well known, the names are not obtainable, and it is doubtful if even the families of the men know what boat the head of the family shipped on. It is safe to venture the statement that outside of boats which carry their crews year in and year out, the names of the men shipped on any boat within the past month are not known to anyone on shore.

New Tonnage—Lake Carriers' Matters.

Special Correspondence to the MARINE REVIEW.

BUFFALO, N. Y., June 8.—A letter received by Secretary Keep of the Lake Carriers' Association the other day set him to compiling the new tonnage that will be added to the American fleet on the lakes for the year ending August 1, 1893. A survey of the ship yards and of the new additions to the fleet produces these figures: Net tonnage of new vessels carrying freight for hire 69,869 tons, of which 56,609 tons are steam, and 13,250 tons are sail. He finds that twelve steamers went out of existence last year, measuring 8,722 tons, and twenty-four sail vessels measuring 7,087 tons, a total of 15,809 tons. It will not answer, however, to accept this as the actual decrease, for there are so many vessels laid up in the boneyard worn out, that Secretary Keep thinks the above total ought to be doubled. Let us say that 30,000 tons went out of existence last year and we have still an amount of new tonnage more than twice that figure. The question raised was whether this increase is warranted by the increase of business. Mr. Keep gives the figures and leaves the question for somebody else to answer. How much freight can this additional 39,000 tons carry?

The fact that the canal is the greatest money maker this season continues to surprise everybody. There has not been anything like a boom for that route since 1886 and that was for only a single year, but now the boats are doing all the business they can and a fleet twice as large would find enough to do. A great part of the wheat goes by canal, the roads taking the lead only in oats. But the poor scalper has to be pleased one way and sad the other. He took lots of grain at about 4 cents and now he has to work hard to get boats at 5 cents. Were he not a boat owner himself pretty generally he would be driven out of business.

It doesn't look now as though the raft meeting would be held before July and that will probably send it over till fall. Gen. Alger's office still neglects to report his movements and the inference is that he is not getting ready for the undertaking very fast.

Buffalo is again right side up in elevator room—never having been very badly upset, in fact not half so badly as was expected at one time. The April storm had its good uses in spite of its terrors and this was one of them. The general holding out of cargoes from all ports at present is worthy of mention.

Heavy Canadian Grain Shipments—Dominion Marine.

Special Correspondence to the MARINE REVIEW.

KINGSTON, Ont., June 8.—The Canadian papers are discussing whether the abolition of discriminating features in Welland canal tolls has affected the grain trade to Canadian ports. Some forwarders, as will be remembered, were afraid that Kingston trade would be diverted to Ogdensburg if the discrimination was done away with, but the facts do not show such a result, at least not so far. Mr. James Stewart, local manager of the Kingston and Montreal Forwarding Company, was asked by your correspondent as to the matter, and he replied: "We have received more grain than we can conveniently handle. In 1892, for May, we transhipped 500,000 bushels, but last May the grain handled reached 1,500,000 bushels. The surplus grain, for which we had no facilities for handling, was sent to Ogdensburg and retained in the elevator until we could dispose of it. If there had been an elevator in Kingston we would not have had to send it away."

"What is the cause of the heavy shipments?"

"I attribute it principally to the low prices of grain, which, instead of

being held back, is now being sent forward, because it has reached a shipping basis."

This is one side of the question. Mr. A. G. Thompson, the Montreal manager of the Montreal Transportation Company, asserts that it is impossible to form an accurate idea of the effect of the abolition of the toll. The season's conditions are abnormal. The Canadian route is much the cheapest and thus trade is diverted this way. He puts it in this form: "The charges from Chicago to Kingston are 3 cents and to Ogdensburg 3½, and from Kingston to Montreal 2½ cents, making the cost of transportation 5½ to 5¾ cents. It costs 1½ cents to bring wheat to Buffalo, and 5 cents through the Erie canal, making 6½ to New York. So, at present, the canal toll is not felt, but let the Erie rate go down to 2½ cents, as it did last August, and then the effect would be felt."

The general concensus of opinion is that if there was an equality of rates the Erie route would be popular and the St. Lawrence route would suffer.

The auxiliary steam yacht Wild Duck, valued at \$180,000 and owned by Mr. John M. Forbes, a retired tea merchant of Boston, is the first pleasure boat of large dimensions to pass through the canals on the way to Chicago. She is now at the fair and is a good sample of an American auxiliary steam yacht. The Wild Duck is the only center-board steamer afloat. The board is between the boilers and is 21 feet long. Under sail, with a spread of 15,000 square feet of canvas, she can make from 12 to 12½ knots and with steam she makes 10 knots. She is very handsomely fitted up and has accommodations for twenty-five passengers. Mr. Forbes, aged seventy years, is accompanied by his daughters and grand-daughter.

Great crowds gathered at Gravenhurst to witness the launching of the steamer Medora, the composite screw steamer of the Muskoka Navigation Company. The ways had sunk, however, and she could not be moved. The launch was quietly accomplished some days later. The steamer is 125 feet keel, 25 feet beam and 8½ feet hold. She is propelled by a compound engine and a Trout wheel. She cost \$25,000.

The steamer Bannockburn, built in England for the Montreal Transportation Company, will arrive at Montreal this week. She will enter the grain trade.

Pilot Goulette, for forty years in the service of the Richelieu and Ontario Navigation Company, and who had piloted thousands of persons through the rapids of the St. Lawrence river, is dead. He never met with an accident during his career.

Exorbitant Port Charges.

Reports from the masters of steamers who took coal to Fort William on the opening of navigation, will certainly act to the disadvantage of shipping interests at that port, as well as Port Arthur. As reported in dispatches announcing that the coal fleet had worked through the ice, an additional obstruction in the form of a sand bar was found in the bay at the entrance to the harbor, and the steamers Lansing and Craig grounded on this bar. When the bar was discovered, the harbormaster announced that a channel would be dredged immediately for the stranded vessels, but there was no dredge to be had that was in readiness for such work, and Capt. Ennis of the Lansing says that the city officials, who refused permission to any of the other steamers in the fleet to pull on the stranded boats, compelled him, with threats of doing the work themselves, to pay \$100 an hour to a small tug and \$2 a ton for lightering. The tug worked on his boat but about fifteen minutes, but the charge of \$100 had to be paid just the same. Here is a list of extra charges paid to the Lansing: Tug hire, fifteen minutes, \$100; lightering 150 tons, \$300; reporting and clearing at Fort William, \$3; reporting and clearing at Port Arthur, \$3; port charges, probably applied to expense of private dredging, etc., \$5; consular fee, \$2.50; trimming charges on grain, unnecessary at a Lake Superior port, \$45; total, \$458.50. Vessels loading grain, Capt. Ennis says, are compelled to hire trimmers, although this is unnecessary in many boats, on account of the draft of water limiting the amount of grain that can be carried.

Official Numbers and Tonnage.

The bureau of navigation, E. C. O'Brien commissioner, assigned official numbers and tonnage to the following lake vessels during two weeks ending June 3: Steam—Santa Marie, Detroit, Mich., 1,357.04 tons gross, 678.52 net, No. 116,514; Detroiter, Toledo, O., 138.57 tons gross, 69.29 net, No. 157,370; Senora, Detroit, Mich., 24.54 tons gross, 12.27 net, No. 116,569; Okoboji, Chicago, Ill., 15.49 tons gross, 10.97 net, No. 155,240; Oneida, Chicago, Ill., 15.49 tons gross, 10.97 net, No. 155,241; Osceola, Chicago, Ill., 15.49 tons gross, 10.97 net, No. 155,242; Abyssinia, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,015; Alaska, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,016; Albania, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,017; Algeria, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,018; America, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,019; Arabia, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,020; Argentina, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,021; Asia, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,022; Australia, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,023; Austria, Chicago, Ill., 13.72 tons gross, 8.27 net, No. 107,024; Mary Stewart, Evansville, Ind., 91.92 tons gross, 91.92 net, No. 92,515; Silver King, Buffalo, N. Y., 37.42 tons gross, 31.18 net, No. 116,571; Washington, Chicago, Ill., 11.16 tons gross, 6.44 net, No. 81,438. Sail—Ed. McWilliams, Detroit, Mich., 743.91 tons gross, 706.72 net, No. 136,363.

Iron Mining.**VALUE OF LEADING STOCKS.**

Quoted by Chas. H. Potter & Co., No. 104 Superior St. Cleveland, O.

Stocks.	Par Value.	Bid.	Asked.
Cleveland-Cliffs Iron Company.....	\$100.00	\$.....	\$.....
Champion Iron Company.....	25.00	26.00	.....
Chandler Iron Company.....	25.00	.....	40.00
Jackson Iron Company.....	25.00	.....	75.00
Lake Superior Iron Company.....	25.00	26.00	.....
Minnesota Iron Company.....	100.00	.....	60.00
Pittsburgh & Lake Angeline Iron Co....	25.00	.....	140.00
Republic Iron Company.....	25.00	.....	9.25
Ashland	25.00	.....	.....
Section Thirty-three.....	25.00	1.00	.....
Brotherton.....	25.00	2.00	2.50
Iron Belt.....	25.00	2.40	2.75
Aurora.....	25.00	6.50	7.00

It would be very interesting to compare just now the aggregate shipments of iron ore to June 1 of this season with the aggregate of June 1 a year ago, but officials of the Chicago & Northwestern Railway refuse to give to even the ore sales agents the figures covering the movement from Escanaba or Marquette, and anything obtained other than from the dock managers acting for this company would be unofficial. Shipments from both docks at Ashland to June 1 foot up 98,011 gross tons, and the total movement from Two Harbors on the same date was 90,782 gross tons. Of the shipments from Ashland, the Lake Shore road furnished 58,372 tons and the Wisconsin Central 39,639 tons. Shipments from Two Harbors were divided as follows: Minnesota, 40,150 tons; Chandler, 46,268 tons; Cincinnati, 4,364 tons.

Iron mining stocks, like everything else in the way of investments, are even more lifeless than they have been for some months past, on account of the money stringency, but the Duluth promoters of the Messabi properties continue to report some transactions and send out the following list of prices asked for leading stocks: Biwabik \$21.50, Great Northern \$5.50, Lake Superior \$2.25, Little Messabi \$3.50, Mountain Iron \$75.00, Messabi Mountain \$13.00, Shaw \$2.40, Adams \$11.00, Buckeye \$2.50, Commo dore \$2.00, Great Western \$4.00, Lackawanna \$1.90, McKinley \$23.40, Messabi Chief \$4.15, Tonawanda \$2.00, Zenith *\$2.00. The star indicates a par value of \$25, while in all other cases the par value is \$100.

A Mysterious Collision.

When the Mutual Transportation Company's steel steamer Corsica was docked in Cleveland, Wednesday, there was as much mystery attached to the fracture in her side as there was to the Lake Huron collision for two or three days after it happened. How such a break as that sustained by the Corsica was occasioned will probably never be known, as it is certain the boat with which she was in collision, the schooner Corsican, went down with all hands, and an examination of the steamer's entire crew fails to furnish an explanation for her peculiar injury. The indentation in the boat is full 36 feet abaft the stem on the starboard side, and the crack, which is probably not more than two inches wide at any point, is about ten feet up and down, with only two feet of the ten above the water line. Dispatches from Alpena immediately following the collision were misleading, and the statements of the officers and crew put a different light on the accident. The collision occurred about 3:30 in the morning. Capt. Wm. Cumming had turned in when the fog, which was of the kind that hangs low on the water, with stars and lights to be seen from the upper parts of a vessel, had partly passed away, and he left orders to be called in case of a return of bad weather. Mate Johnson, who was in charge, says that there was nothing to indicate that another vessel was in the vicinity of the Corsica, when suddenly, on the starboard bow, the dark sails of a schooner loomed up little more than a length away. He gave the orders "starboard" and "hard-a-starboard" in quick succession, but the steamer was probably not moved more than five points by the action of the wheelman in accordance with these orders when the crash occurred. The schooner was burning no torch, which would be against her from a legal standpoint. On the other hand, considerable importance is attached to the question of the Corsica's speed throughout the fog, and also the question of constant fog signals from the steamer, but on these points the interested parties are, as is always the case, unwilling, of course, to express themselves very freely publicly. Members of the crew agree that Capt. Cumming's first order on rushing to the deck and learning meager details was to turn his boat around to look for the crew of the schooner, and that about half

an hour was spent in the search before the vessel was turned to the westward for shore. All this time precautions were taken, of course, in making preparations to leave the Corsica if such action was necessary, and it was this commendable proceeding that caused the talk about a panic on the big steamer. Both mate and lookout agree in their description of the schooner and the relative positions of the two vessels, and the lookout says that after the collision he hurried aft to where the schooner had dragged along under the Corsica's stern and saw the head-gear all in a heap on the water. Still there is nothing in the Corsica's strange injury to indicate that she had been struck bow on by the schooner, and stranger than all, nothing was heard from the latter's unfortunate crew.

Superintendent Smith of the Globe Iron Works Company's ship yard says that the job of patching the Corsica, which was done at Alpena, with few tools and poor facilities, by Mr. Ludington, who looks after wrecking matters for Gilchrist & Fletcher, was the best thing of the kind that he has seen in all his experience with injured steel vessels.

Clearing the Stocks.

The only freight steamer now under construction in Cleveland, the Alva, built for M. A. Bradley and others by the Cleveland Ship Building Company, was floated Tuesday. Another boat to be added to the Bradley fleet, the wooden steamer Geo. Stone, being built by F. W. Wheeler & Co. of West Bay City, will be launched in about ten days. Features of special interest in the Alva have been referred to on various occasions in the REVIEW, and it is enough now to say that, on account of special precautions taken in her construction, she is undoubtedly one of the strongest steel boats ever put together on the lakes. She is 340 feet over all, 324 feet keel, 42 feet beam and 25 feet depth. Capt. J. A. Holmes will command the Alva and William Taylor will be in charge of her machinery.

At F. W. Wheeler & Co.'s yard, West Bay City, the schooner Ed. McWilliams was launched a few days ago and is about ready to join the Stafford and Francomb tow, for which she was built. This boat, which is owned by the Hope Transportation Company of Detroit, is 210 feet over all, 30 feet beam and 14½ feet hold.

Classification for Whalebacks.

The American Shipmasters' Association of New York, publishers of the Record of American and Foreign Shipping, classed the following vessels during the past week: American three-masted schooners Lena R. Storer and Navarino, American bark Annie Reed, American screw whaleback steamer Christopher Columbus, American whaleback barges 126 and 127, British half brigs Britannia and Solario, British schooner Florida, British screw steamer Cariboo and Fly, Swedish bark Indien, Swedish brig John and Russian bark Richard.

Personal Mention.

David Vance of Milwaukee, M. M. Drade of Buffalo, A. A. Parker and Col. William Ludlow of Detroit, were among visitors in Cleveland during the week.

Colonel G. H. Elliott, corps of engineers, U. S. A., at his own request, has been relieved from further service with the light-house board, and Major Adams, corps of engineers, now on duty at the war department, will be ordered to that duty in his place.

Mr. Norman B. Conger, weather bureau inspector in charge of the lake marine, and who has taken up the work of investigating currents, velocity of wind, etc., recently begun in Cleveland by Dr. Penrod, makes his headquarters in Detroit. Mr. Conger will undoubtedly meet with a cordial reception at the hands of vessel masters, whose assistance will be needed in his work, as he is a gentleman of agreeable manner, well qualified for such duty.

Commander Nicoll Ludlow, who made many friends while in charge of light-house matters on Lake Michigan, and who was transferred to the Mohican just previous to her departure for Honolulu, is still in command of that vessel and the Behring sea fleet of which she is the flag ship. Although lake vessel owners were loth to part with Commander Ludlow, they have reason to congratulate him upon the recognition accorded him by the department in the important duties to which he has been assigned.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Chicago Office, Western Union Building, 110 LaSalle Street.
Published every Thursday at No. 516 Perry-Payne Building, Cleveland, O.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,657 vessels, of 1,183,582.55 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1892, was 321 and their aggregate gross tonnage 534,490.27; in all other parts of the country the number of this class of vessels was, on the same date, 217 and their gross tonnage 321,784.6. The classification of the entire lake fleet is as follows:

Class.	Number.	Gross.
Steam vessels	1,631	763,063.32
Sailing vessels.....	1,226	319,617.61
Canal boats.....	731	75,580.50
Barges.....	69	25,321.12
Total.....	3,657	1,183,582.55

Tonnage built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1888.....	222	101,102.87
1889.....	225	107,080.30
1890.....	218	108,515.00
1891.....	204	111,856.45
1892.....	169	45,168.98
Total.....	1,038	473,723.60

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,89,014
Days of navigation	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

In an article in the current number of the North American Review, Mr. J. H. Biles, the designer of the Paris and New York, suggests that 30 knots an hour to Europe is within the range of calculable possibility, and that in all probability the passage will be reduced to a little over four days within the next ten years. Mr. Biles inclines to enthusiasm on the subject of fast Atlantic passenger ships, and some of his writings of late appear visionary, but as an expert who has won laurels his opinions on this question have been accorded attention by many well informed people who would lay aside similar views coming from other naval architects of less distinction. The use of nickel steel, the introduction of a lighter type of boilers, additional draft and, of course, a larger ship are the main sources of increased speed suggested in support of the arguments presented by Mr. Biles. If a draught of four feet could have been added to the present Atlantic steamers they could, the writer says, have been designed to have a speed of one and a quarter knots more, or to have a gain of about eight hours on the run across. A concluding paragraph in the article is as follows: "A vessel 1,000 feet long, 100 feet wide, with a draught of water of thirty feet, with a structure built of stronger steel than that at present adopted, with lightened boilers, with oil or some equally light fuel instead of coal, and with the steady general improvements in methods of construction and management of ships and machinery, such a vessel will be capable of crossing the Atlantic in a little over four days. The design of such a vessel will involve the consideration of many problems of structural detail, but there is nothing insuperable in any of the difficulties which will accompany such a project. Whether the carrying out of such a work will be done in the old or in the new world time can only show, but when it is undertaken, whether by the old or the new, there is no reason to doubt that it will be successfully carried out."

CAPT. ALEX. McDougall, inventor of the whalebacks, Walter Miller, superintending engineer of the Globe Iron Works Company, and other gentlemen in scientific pursuits, who are well known on the lakes, will represent this section of the country in the International Engineering Congress, to be held, in connection with the World's Columbian Exposition, in Chicago during the last week of July. Capt. McDougall and Mr. Miller will both present papers, the former on "Whaleback Steamers" and the latter on "Steam Shipping of the Great Lakes." This congress will bring together the most distinguished representatives of the ship building industry of Great Britain, France, Spain, Italy and other leading maritime nations. Lists of authors and papers covering the branch of the congress devoted to marine and naval engineering and naval architecture appear elsewhere in this issue.

CONGRESSMAN TOM L. JOHNSON, free trader from the Cleveland district, ejected a little free ship screed into a letter published in the REVIEW on May 11, in which he was answering the claims of Mr. R. P. Joy of Detroit, that a duty of 10 per cent. on goods imported in foreign vessels would be beneficial to the mercantile marine of the United States. An article in the Cleveland Leader of Monday, the 5th inst., signed N., takes Mr. Johnson to task in an able manner. The writer, whoever he may be, is undoubtedly a careful observer of commercial matters.

New Classification Society.

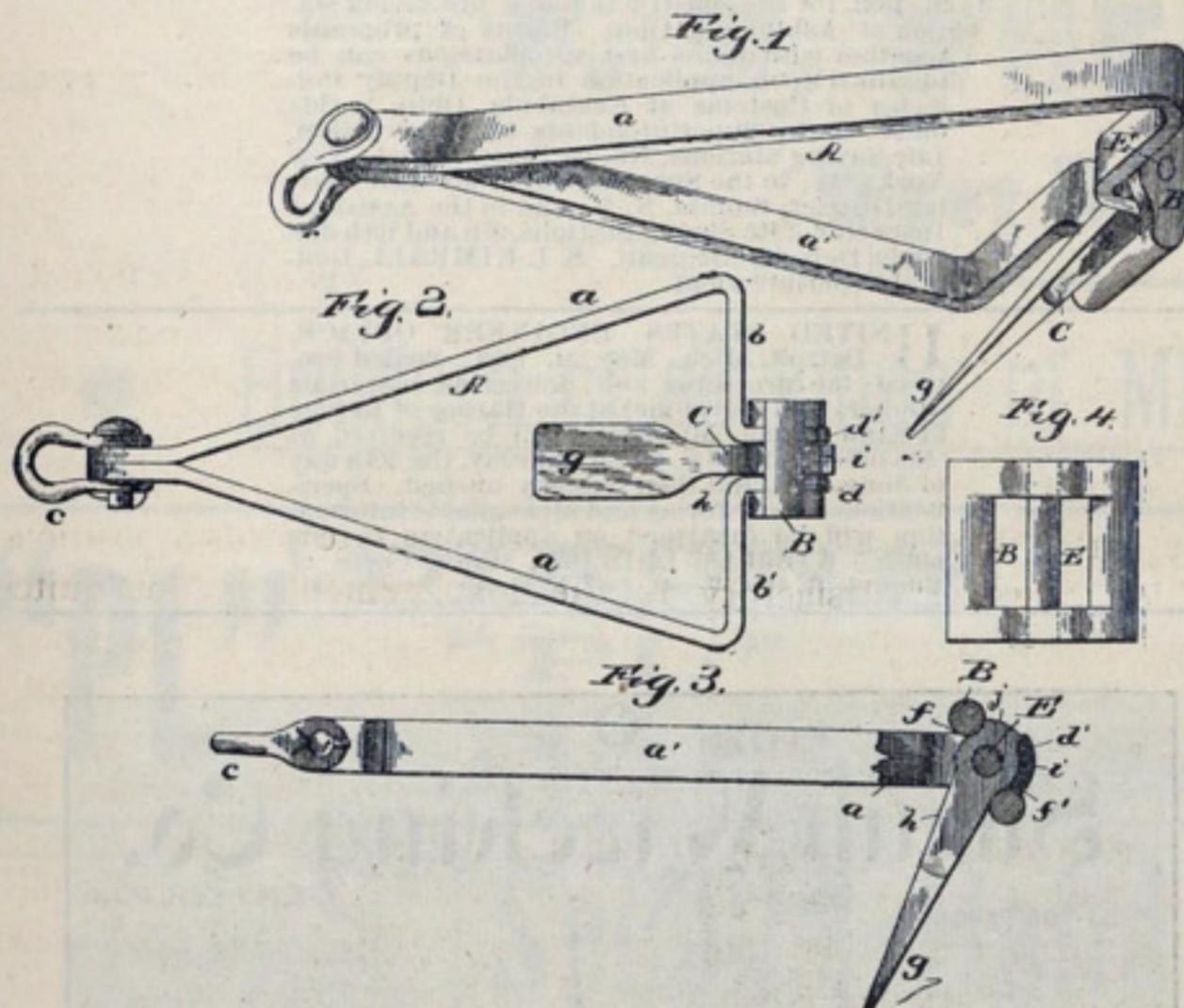
Commenting upon the organization of the new British association for the classification of ships, which is known as the British Corporation for the Survey and Registry of Shipping, Engineering of London says: "Since the absorption of the Liverpool organization for the registry of shipping by Lloyd's, the latter has had an unchecked advance towards a position which, however satisfactory to the management, is not quite agreeable to the client. The spirit of the age is entirely opposed to monopoly, which in great measure, retards progress. The all-powerful position of Lloyd's has fostered a conservatism which is adverse to the adoption of new ideas, even when suggested by ripe experience. Innovations are not always to be commended, and Lloyd's have very properly observed caution in some respects; but in other instances, where the change has been forced on the marine constructor by the satisfactory character of preliminary tests, the contravention of the letter of Lloyd's rules should scarcely have been sufficient to bar progress. Thus it is that many have at various times been annoyed, and the spirit of opposition has been fostered. The culminating point was reached when the load line act of 1890 was passed, because ship owners foresaw that without action Lloyd's would have, under the enactment, a sole right in the determination of what was to constitute the load line. The load line depends upon scantlings, and this meant that Lloyd's would have a monopoly of classification also. This would, under the circumstances, have been most unfortunate, as it would have tended to check enterprise in ship building, and reduce marine constructors to the level of manufacturers. The British corporation for the Survey and Registry of Shipping was therefore formed, not so much in antagonism to Lloyd's, but because of the profound conviction that monopoly is not desirable. Its great strength is largely due to the fact that it comprises ship builders, marine engineers, etc., as well as ship owners and representatives of all classes of shippers. Not only is it representative in this respect, but it comprises within its organization nearly all the Clyde men of influence, and many of those in the north of England, and in Ireland and Liverpool."

The new association has just issued in book form the regulations upon which the survey and registry of vessels will be based. The rules are primarily the work of the late Professor Jenkins and Mr. Archibald Denny.

Capt. Alex. McDougall's Patents.*

ANCHOR—SPECIFICATION FORMING PART OF LETTERS PATENT NO. 445,816, DATED Feb. 3, 1891—APPLICATION FILED MARCH 24, 1890—SERIAL NO. 345,019—NO MODEL.

In describing this anchor, which is of the stockless, single fluke type, the inventor says: "The principal objects of my invention are to provide and produce an anchor of that variety which can be manufactured very cheaply, which will be extremely portable and occupy but little space on the deck, and which will be very effective in operation. To this end the invention consists, generally, of a main triangular metallic frame-work, a single fluke or blade pivoted within said frame, and a pivoted link for limiting the movements of the fluke. Fig. 1 is a perspective view of the anchor; Fig. 2, a plan view of the same; Fig. 3, a side elevation, partly in section; Fig. 4, a separate elevation of the link and pivoting pin. A represents the main frame of the device made of the general rectangular shape shown, viz., with the two inclined sides *a a'* and the two short connecting sides *b b'*. This frame-work may be made of cast metal, if desired, but I prefer to make the same of rectangular wrought iron or steel bars heated and hammered to the proper shape. The two inclined sides at their forward ends are either welded or riveted together, or else these sides may be made of one and the same piece of metal bent around into position. It is more economical, however, to make the frame-work of two parts, each



consisting of a side piece and one of the connecting side pieces *b* or *b'*, since both of the said side pieces will be of the same shape, and they can therefore be constructed very easily and cheaply. At the forward end of this frame-work is a shackle, swivel, or ring *c*, to which the anchor chain or rope is attached. Each of the connecting side pieces *b* and *b'* of the frame is bent over at its inner end to form lugs or ears *d* and *d'*, projecting outwardly. Passing through these lugs or ears *d d'* is a metallic pivoting pin *E*, arranged so as to turn easily in said lugs or ears. The ends of this pivoting pin extend out on the sides of the lugs or ears, and are integrally connected with a link *B*, before referred to, and arranged as shown. This link is of the ordinary construction, and is of the general form shown in the drawings. By this means the link will be allowed a certain limited movement on the pivoting pin, so that it may be inclined either to the right or to the left as may be desired. The movements of this link are restricted by the bearing surfaces *f f'* thereof coming in contact with the upper and lower faces of the lugs or ears *d d'*. The fluke *C* of the anchor is pivoted between the lugs or ears *d d'* on the pin *E* and is capable of movement on this pin. The fluke is provided with a blade *g*, adapted to enter the ground, with a shank portion *h*, with an enlarged head *i*, through which the pivoting pin *E* passes, and with a small lug *j*, forming a continuation of said enlarged head. When the fluke is in position on the pivoting pin, and when it is moved in one direction as far as possible, it will be seen that the portion of the shank *h* directly below the head *i* will engage with one of the surfaces *f* of the

link *B* and that the lug *j* thereof will engage with the other surface *f* of the link, so that the fluke will be held very rigidly from other movement. It will also be evident that to which ever side the fluke may be moved it will be locked in its proper position by the link *B*, as I have just explained. This means for locking the fluke in position is very strong and rigid, since the link bears against three immovable surfaces, viz., the pivoting pin and the upper and lower surfaces of the lugs or ears *d d'*, and the fluke bears against three surfaces also, viz., the pivoting pin and the two surfaces *f f'* of the link.

"The operation of the anchor is as follows: The device is lowered from the vessel in the usual way, and will, of course, rest in a flat position on the bottom. The fluke will drop by its own weight and will enter the ground, and as a strain is brought on the anchor by the movement of the vessel the fluke will be forced farther into the ground until it has reached an angle of about fifty degrees, when its motion will be arrested by the link, as was before explained. As an additional strain is brought upon the anchor, the fluke will be caused to bury deeper in the ground until the dirt, sand or gravel of the bottom is piled up in front of and around the connecting pieces *b b'*, so that the anchor will be firmly embedded in the ground. Whichever side the anchor may fall on, the fluke will enter the ground with equal facility, since it is pivotally mounted on the pin, and its movement will be restricted by the link *B* on either side, as will be understood.

"What I claim as new in the invention is: First—in an anchor, the combination of a metallic frame-work, a single fluke pivoted to said frame-work, and a link, substantially as described, pivoted so as to surround the shank of said fluke and limit the movements of the same. Second—an improved anchor consisting of a frame-work of a general rectangular shape having cross pieces *b b'* at its rear end and adapted to engage with the ground, lugs or ears formed by a continuation of these connecting pieces and extending rearwardly, a single fluke pivoted between these lugs, and a link *E*, mounted on the pivoting pin *b* or the fluke, and surrounding the shank of the same, and adapted to limit the movements of the fluke, substantially as set forth. Third—an improved anchor consisting of a metallic frame having lugs *d d'* at its rear end, a single fluke pivoted between said ears, and carrying a lug *j*, and a link mounted on the pivoting pin for the fluke and adapted to limit the movements of the fluke, substantially as set forth."

Device for Using Graphite.

As a result of a great deal that has been written lately regarding the use of graphite for bearings, engine cylinders, gaskets, steam and gas joints, etc., many engineers who were ready to condemn anything in the way of graphite now use the

best quality of this material with the greatest satisfaction. Frank V. Fisher, engineer of the Dover waterworks, Dover, N. H., shows in the accompanying drawing what can be done in the way of making a device out of material which every engineer has at hand, for introducing graphite into engine cylinders. In a letter to the Joseph Dixon Crucible Company of Jersey City, N. J., he says: "I have used plumbago for years in locomotive cylinders and journal boxes, in stationary cylinders and bearings, on bolts, studs and pipe threads, hand-hole and man-hole gaskets, and for cylinder, steam chest and flange pipe-joints. Dixon's flake lubricating graphite is the best of any I have used heretofore. I have always either pumped or poured the plumbago into the cylinders. Dixon's dry flake graphite I feed into the steam chests with cups made from piping, as shown in the sketch. In the nipple indicated by arrows

I drive in a brass plug and drill a $\frac{1}{16}$ in. hole. I fill the cup once in three days and the steam takes care of the graphite. I have reduced the feed of cylinder oil one-half of the amount formerly used. I put one cup on each high pressure steam chest, and the exhaust carries the graphite over into the low pressure cylinder and over into the air pump. It is used three times and discharged into the river. It is not worth trying to save it to use over, as I have heard some say they do."

No master trading to Lake Superior should be without a chart of the north shore. We have them for sale at \$1 each.

*Under this heading we will publish specifications accompanying letters patent granted to Alexander McDougall since his first application for a patent on the whale-back type of vessel May 1, 1880.

Around the Lakes.

Thirty-two thousand barrels of flour constitute the last cargo of the steamer Selwyn Eddy from Duluth to Buffalo. This beats the W. H. Gilbert's record 2,000 barrels.

An advertisement in another part of this issue calls for bids on timber, iron and stone, to be used on government work at Sand Beach. Proposals for furnishing material and constructing a life saving station at Ashtabula are also invited.

The wrecking steamer Favorite, Capt. Mart Swain, seems to be widening her scope of usefulness. After the newspaper dispatches had reported the tug Winslow, which was ashore in Georgian bay, a total loss, the Favorite released her, and it is now said that the boat is not badly damaged.

Arriving at Fairport on Monday morning of last week from Escanaba, the steamer Maryland unloaded 3,088 gross tons of Norrie ore and got away the same evening. She reached Fairport on her next trip on Saturday morning and left the same evening, after discharging a similar cargo, having placed 6,177 tons of ore on the dock in a single week, the largest showing ever made in the same length of time by any lake steamer.

Land lines and sub-marine cables connecting the offices of the weather bureau in Alpena with Thunder Bay island and Middle island will be completed in about two weeks time. Display stations will then be established on both islands in full view of all vessels passing both up and down. These islands are thought to be two of the most important points on Lake Huron for a display of signals, and the improvement will be appreciated, but the officers of the weather service have certainly been a long time at this work.

Notices to Mariners.

Notice is given by the light-house board that on and after June 15, during thick or foggy weather, a bell will be struck by machinery, a double and a single blow alternately, at intervals of twenty seconds, at the bell tower recently erected on the south pier at the entrance to the harbor of Frankfort, east shore of Lake Michigan.

A notice from the Canadian minister of marine directs attention to the existence of a submarine telegraph cable laid between Point Pelee and the mainland, Lake Erie. The cable is laid from Point Pelee nearly parallel with the sand bar for half the distance to the dummy light, thence southwesterly, passing slightly to the westward of the middle ground to the north point light-house on Pelee island. Any one who wrongfully or by culpable negligence breaks or injures a submarine cable is liable to fine and imprisonment. In cases, however, of accidental fouling with the cable, owners of vessels who can prove having sacrificed an anchor in order to avoid injuring the cable, will be compensated therefor. Where damage has inadvertently been done to the cable with the object of saving life or of preserving the vessel, the circumstances should be reported to the superintendent of government telegraphs, Ottawa, in order to avoid the inconvenience of prosecution.

Trade Notes.

The Worcester Consolidated Street Railway Company of Worcester, Mass., has placed the contract for its new car house with the Berlin Iron Bridge Company of East Berlin, Conn. The new building will be 95 feet in width and 290 feet in length, entirely of brick and iron.

Two vessels suited to special service are offered for sale in our advertising columns. The supply boat E. M. B. A. is a small steam craft adapted to harbor delivery work or passenger traffic in smooth water. Particulars can be had from Louis L. Ordner, Main street bridge, Cleveland. J. H. Thompson of Bay City, Mich., offers for sale a two-thirds interest in a schooner capable of carrying 500 tons of coal or 350,000 feet of lumber.

Henry R. Worthington of New York has just issued a very handy map of the business portion of Chicago and the World's Columbia Exposition, which will be interesting to every one who may want information at the big fair. Incidentally a little history of steam pumping engines is given, and the location of Worthington exhibits throughout the grounds is shown. In this connection it is interesting to note, that in all the public pumping of every description, and in the majority of private exhibits where pumps are needed, the machinery is of Worthington manufacture. A copy of this map will be mailed to any one sending a postal card to W. D. Kearfott, Cleveland sales agent.

Waiting on the President.

Vessel owners of the lakes are eagerly waiting for President Cleveland to break off the fishing habit long enough to sign the wrecking reciprocity proclamation. The Canadian government has fulfilled its share of the agreement and the further delay makes it doubtful whether there has not some further hitch developed. The Welland canal clause was dropped after some argument and nothing further was supposed to stand in the way, but our people are suspicious.

Everybody Pleased.

On all sides are heard expressions of approval of the Nickel Plate road's new train service which went into effect on Sunday, May 28. Three fast trains are now running in each direction daily, and daily in this case means seven days a week. Superb dining cars and through sleepers to and from New York, Chicago and Boston form part of the new equipment of the Nickel Plate road.

1-8-15

An Accomplished Fact.

The new train service on the Nickel Plate road went into effect on Sunday, May 28. Three trains are now run in each direction daily, leaving Buffalo going west at 5:50 a. m., 12:05 noon, and 11:25 p. m., and leaving Chicago for the east at 7:35 a. m., 2:30 p. m. and 9:30 p. m. No change of sleeping cars between New York, Boston and Chicago in either direction. Superb dining cars are a feature of the new service.

1-8-15

TREASURY DEPARTMENT, U. S. LIFE Saving Service, Washington, D. C., June 2, 1893. Sealed proposals will be received at this office until 2 o'clock P. M. of Wednesday, June 21, 1893, for the construction of a life saving station at Ashtabula, Ohio. Forms of proposals together with plans and specifications can be obtained upon application to the Deputy Collector of Customs at Ashtabula, Ohio; to this office; to the Superintendents of Construction, Life Saving Stations, No. 24 State Street, New York City; to the Superintendent 9th Life Saving District, Buffalo, N. Y., and to the Assistant Inspector, Life Saving Stations, 9th and 10th districts, Detroit, Michigan. S. I. KIMBALL, General Superintendent.

8-15

UNITED STATES ENGINEER OFFICE, Detroit, Mich., May 24, 1893. Sealed proposals for furnishing and delivering materials (timber, iron and stone) at the Harbor of Refuge at Sand Beach, Michigan, will be received at this office until 10 a. m. on Tuesday, the 20th day of June, 1893, and then publicly opened. Specifications, blank forms and all available information will be furnished on application to this office. WILLIAM LUDLOW, Major, Corps of Engineers, Rvt. Lieut. Col. U. S. A.

8

THE SWALLOW WRECKING CO. E. M. PECK, Pres't

THE TUG FAVORITE
STATIONED AT CHEBOYGAN MICH.
WITH COMPLETE WRECKING CUTTER
IN CHARGE OF
Capt. MARTIN SWAIN.

CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT MICH.
ENABLES US TO WRECK IN CANADIAN
WATERS.

**STEAM PUMPS AND SUB-MARINE
WORK IN CHARGE OF
JOHN S. QUINN.**
Address all correspondence to
PARKER & MILLEN.
OFFICE 15 WATER ST. WEST,
DETROIT, MICH.

4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.

1 COAL AND ORE PUMP,
3-12 INCH ROTARY,
1-14 INCH WORRINGTON.

DIVING RIGS
AND
DIVERS ABOARD
ALL TIMES

JANUARY	FEBRUARY	MARCH	APRIL
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
10	9	9	9
11	10	10	10
12	11	11	11
13	12	12	12
14	13	13	13
15	14	14	14
16	15	15	15
17	16	16	16
18	17	17	17
19	18	18	18
20	19	19	19
21	20	20	20
22	21	21	21
23	22	22	22
24	23	23	23
25	24	24	24
26	25	25	25
27	26	26	26
28	27	27	27
29	28	28	28
30	29	29	29
31	30	30	30
1	31	31	31
2	1	1	1
3	2	2	2
4	3	3	3
5	4	4	4
6	5	5	5
7	6	6	6
8	7	7	7
9	8	8	8
10	9	9	9
11	10	10	10
12	11	11	11
13	12	12	12
14	13	13	13
15	14	14	14
16	15	15	15
17	16	16	16
18	17	17	17
19	18	18	18
20	19	19	19
21	20	20	20
22	21	21	21
23	22	22	22
24	23	23	23
25	24	24	24
26	25	25	25
27	26	26	26
28	27	27	27
29	28	28	28
30	29	29	29
31	30	30	30

10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9
1-8
1-7
1-6
1-5
1-4
1-3
1-2
1-1

TELEGRAPH
PARKER & MILLEN.
DETROIT.
MICH.

OWNERS AND CAPTAINS—If you want one of these handsome calenders mailed to you, send your address on a postal card, mentioning the REVIEW, to PARKER & MILLEN, Detroit, Mich.

MARINE VALVE OIL

For Cylinder Lubrication is unsurpassed, and is used in 90 per cent. of the large steamers on the great chain of lakes.



ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. M. KINNAN, Ashtabula Harbor, O.
HULL & RAND, Huron, O.

Marine Valve, Renown Engine, Eldorado Engine, Victor Signal, Mineral Seal, Crank Case, Dark Lubricating, Head Light, Arctic Cup Greases, and Lard Oils.

CARRIED IN STOCK AT THE —

Standard Oil Company's Marine Depot.

123 River Street, CLEVELAND, O.

TELEPHONE 77. MAIN OFFICE TELEPHONE 682.

ALSO FOR SALE BY

STANDARD OIL COMPANY,

No. 5 Wabash Ave., Chicago, Ill.
Racine, Wis.
Broadway & Mason, Milwaukee, Wis.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.

West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Sault Ste. Marie, Mich.
Michigan Central Railway & 10th St.,
West Bay City, Mich.
Eighth & Sears Sts., Saginaw, Mich.
46 Jefferson, Detroit, Mich.
Summit & Monroe Sts., Toledo, O.

STANDARD OIL COMPANY, Star Oil Works, Buffalo, N.Y.
BABY & DALE, St. Clair, Mich.
N. C. ALLEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.

A. H. McGONAGIL, South Chicago, Ill.
MARINE SUPPLY CO., Fairport, O.
F. KRAZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo, O.



F. W. WHEELER,
President.

E. T. CARRINGTON,
Vice-President.

F. L. GILBERT,
Secretary.

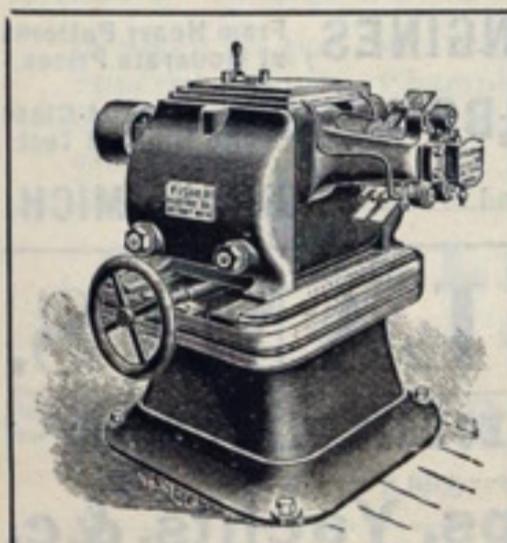
F. W. WHEELER & CO., WEST BAY CITY, MICH.

Builders of all kinds of METAL AND WOODEN SHIPS.

"PL" DIXON'S "PL" GRAPHITE.

Dixon's Perfect Lubricating Graphite is indispensable to every engineer and machinist. It can be used dry or mixed with water, oil or grease. We send free of charge a sample and pamphlet with interesting and instructive information.

JOS. DIXON CRUCIBLE CO., NEW JERSEY, N. J.



Second-Hand Lighting Plants for Sale.

One 300-Light Brush Dynamo,
One 150-Light Brush Dynamo,
One 125-Light Brush Dynamo,

REMOVED FROM STEAMERS CITY OF
CLEVELAND AND CITY OF DETROIT.

One 125-Light United States Dynamo, Removed from Steamer Castalia.
One 300-Light United States Dynamo, Removed from Steamer Tuscarora.
One 125-Light Thomas-Houston Dynamo, Removed from Yacht Wadene.

Fisher Electric Company,

Detroit, Mich.

"Nothing succeeds like success."

The United States Metallic Packings

FOR
Piston Rods and Valve Stems.

After Years of Service it Still Excels ALL Others. In use ON MOST ALL THE LARGE STEAMERS ON THE LAKES.

WRITE US FOR CATALOGUE.

GEO. P. WILSON, Gen'l Agt., 435 North Broad St., Philadelphia, Pa.
614 Rialto Building, Chicago, Ill.

WILLIAM L. BROWN,
PRESIDENT.

W. F. COBB,
VICE-PRESIDENT.

W. I. BABCOCK,
MANAGER.

O. R. SINCLAIR,
SECRETARY.

CHICAGO SHIP BUILDING COMPANY,

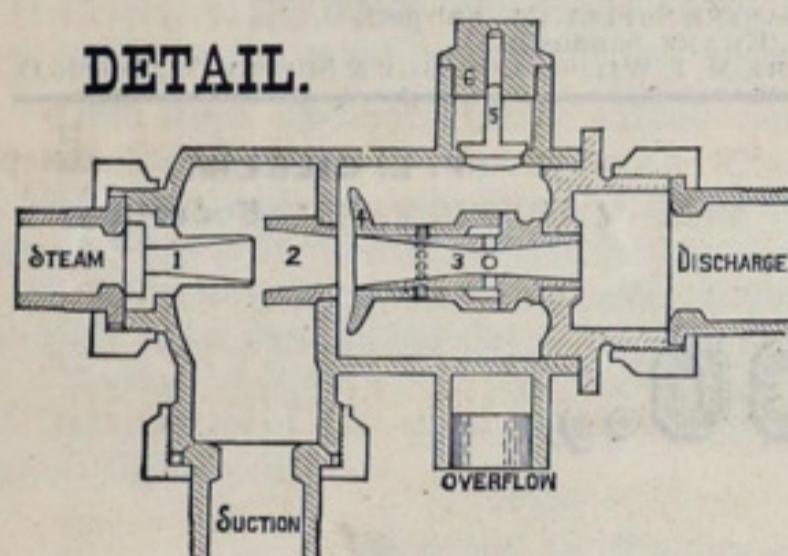
STEEL STEAM-SHIP BUILDERS,

TELEPHONE No. 40.
(South Chicago Exchange.)

101st St. and Calumet River, COLEHOUR, ILL.

The Globe Automatic Injector.

DETAIL.



See the SIMPLICITY OF IT !

SUPERIOR FOR
MARINE BOILERS.

Write for Particulars.

Eagle Lubricator Co.
MANUFACTURERS.

108 Canal St., - Cleveland, O.

A NEAT TRICK.

OWNER—Captain, do you want to see a neat trick explained?

CAPTAIN—Yes sir, what is it?

OWNER—Here is a circular explaining CRAWLEY & JOHNSTON'S "Cincinnati" Automatic Steam Steerer.

CAPTAIN—(After a careful study.) That's the best and simplest I ever saw. "It's a corker." Put one of them on my boat and I'll show you some quick work and save the price of it in a few trips.

OWNER—I'll do it, and advise my friends to investigate it.—Write for prices, etc.

CRAWLEY & JOHNSTON, 119-121-125 East Pearl St., CINCINNATI, O.

GEORGE B. CARPENTER.

ESTABLISHED 1840.

BENJAMIN CARPENTER.

GEO. B. CARPENTER & CO.

Ship Chandlers and Sail Makers.

CORDAGE, TWINES, COTTON DUCK,
MILL, RAILROAD and VESSEL SUPPLIES.

202, 204, 206, 208 SO. WATER STREET,
CHICAGO, ILL.

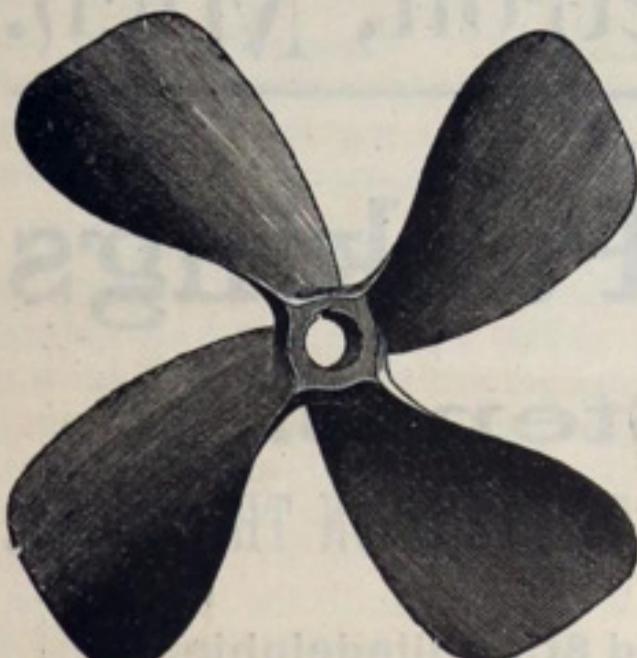
H. G. TROUT KING IRON WORKS,

BUFFALO, N. Y.,
MANUFACTURERS OF
TRIPLE EXPANSION,
THREE CYLINDER,
FORE AND AFT
And STEEPLE COMPOUND
MARINE ENGINES,
High and Low Pressure Engines,
Sectional, Propeller,
Tug and Yacht Wheels.

Cowles Aluminum and Manganese
Bronze Propeller Wheels.

These Wheels are noted for their extra
speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.



THE JENKS SHIP BUILDING Co.

Will have FOR SALE OR CHARTER by the beginning
of navigation, 1893,

THREE (3) STEAMERS

Especially Designed for the Lumber Trade.

If interested, address them at PORT HURON, MICH.

C. H. McCUTCHEON.

(Successor to SAMUEL McCUTCHEON.)

Copper, Tin and Sheet Iron Manufactory, Steamboat and Engineers' Supplies.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and
Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c.,
Leather Belting and Usudurian Packing.

Telephone No. 68.

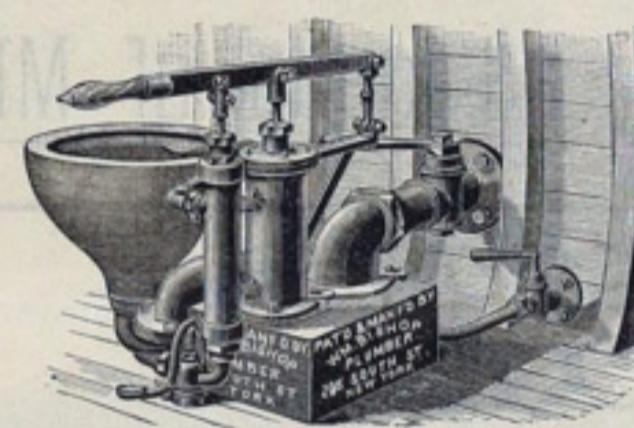
No. 18 Ohio Street BUFFALO, N. Y.

COMBINATION PUMP WATER CLOSET

For Yachts, Pilot Boats,
Naval Ships, Etc.

For above or below water line. No
tank needed, and when below water
line you can flush bowl without hav-
ing to use pump.

WILLIAM BISHOP,
Plumber, Coppersmith & Steam Fitter,
Telephone 4811 Cortlandt,
205 South Street, NEW YORK.
Yacht Fittings a Specialty.



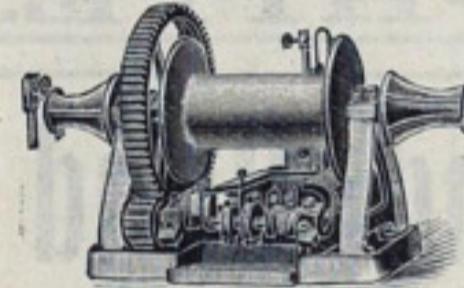
JNO. L. JACKSON,

Builder of DUPLEX HOISTING AND DECK ENGINES.

Plain Finished and Automatic ENGINES, From Heavy Patterns
at Moderate Prices.

Vertical, Horizontal, BOILERS Strictly First-Class
Marine & Locomotive and Highest Test.

Send for Circulars and Prices. SAGINAW, MICH.



SHIP LAMPS.

OIL AND ELECTRIC FIXTURES

FOR Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.
Prices and Cuts on Application.

PAGE BROS. & CO.,

(FORMERLY WILLIAMS, PAGE & CO.)

227 to 233 Cambridge St.,

BOSTON, MASS.

Haycox Sight Connection

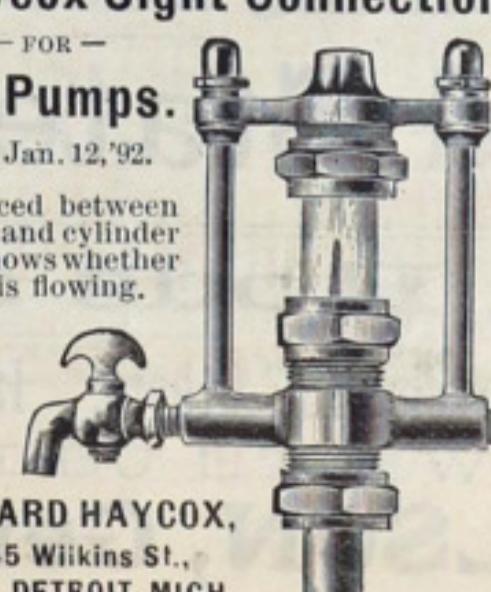
—FOR—
Oil Pumps.

Pat. Jan. 12, '92.

Is placed between
pump and cylinder
and shows whether
oil is flowing.

Write for
Prices and
Circulars.

EDWARD HAYCOX,
145 Wilkins St.,
DETROIT, MICH.

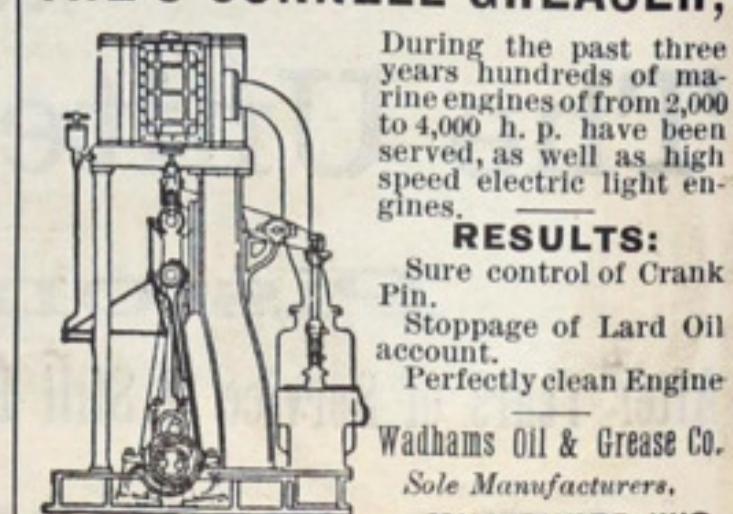


THE O'CONNELL GREASER,

During the past three years hundreds of marine engines of from 2,000 to 4,000 h. p. have been served, as well as high speed electric light engines.

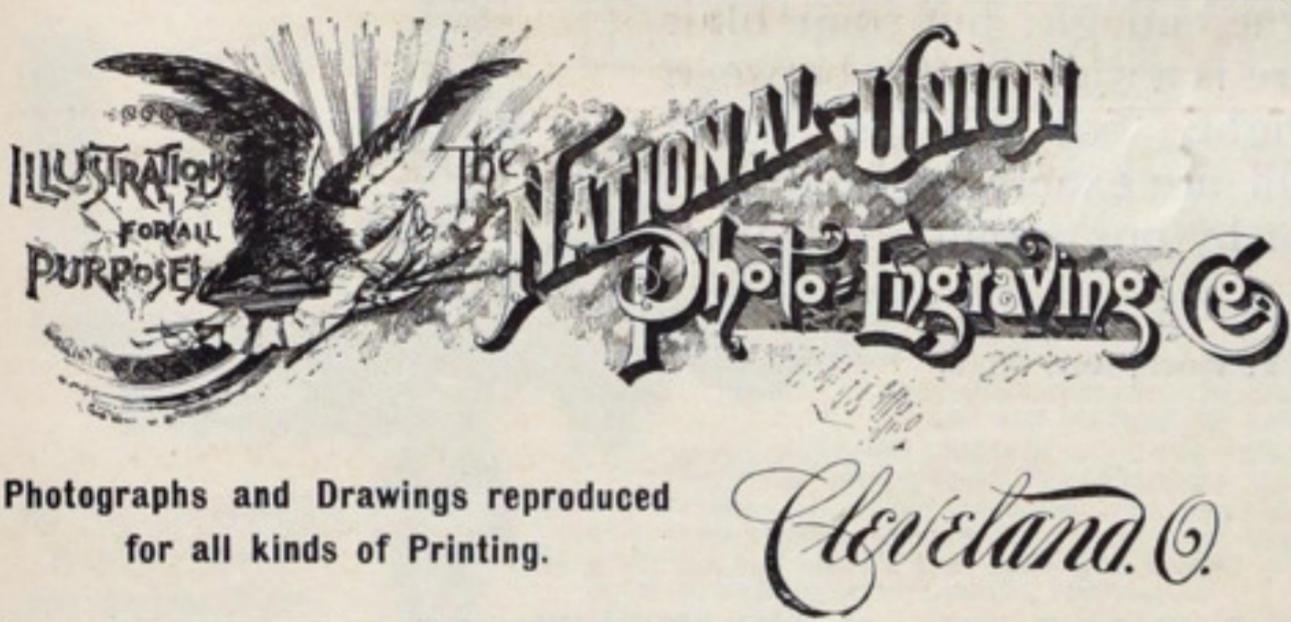
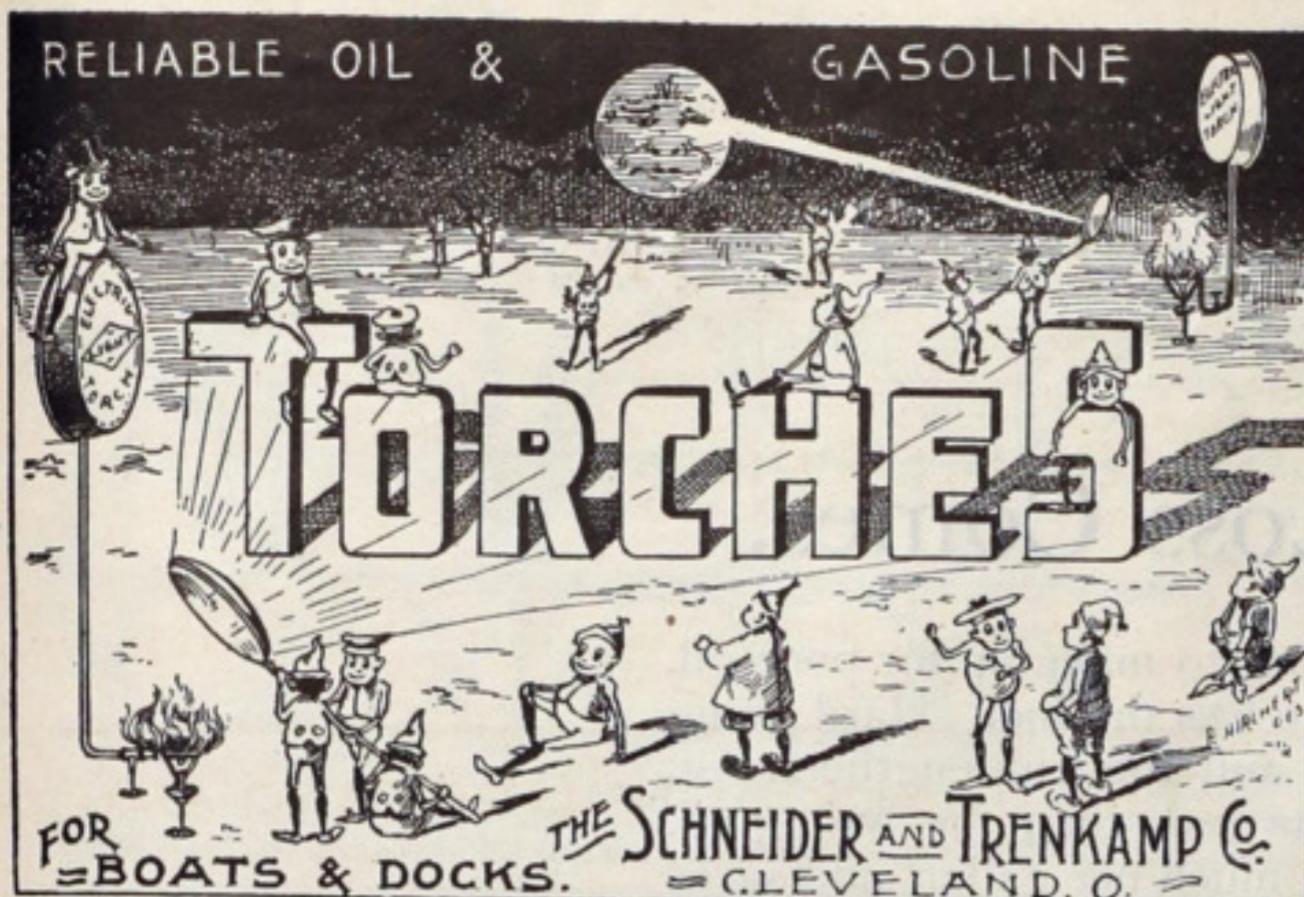
RESULTS:

Sure control of Crank Pin.
Stoppage of Lard Oil account.
Perfectly clean Engine



Wadham's Oil & Grease Co.
Sole Manufacturers,
MILWAUKEE, WIS.

Write for Catalogue and Prices of Cup and Greaser Grease.



Photographs and Drawings reproduced
for all kinds of Printing.

1880.

CHAS. H. POTTER & CO.,
Investment Bankers,
Cleveland, O.

Dealers In

Lake Superior Iron Mining Stocks,

on about 10 per cent. annual dividend basis, Republic Iron Co., Lake Superior Iron Co., Champion Iron Co., Minnesota Iron Co., Jackson Iron Co., Cleveland-Cliffs Iron Co., Chandler Iron Co., Chicago and Minnesota Ore Co.

CONNELLY BROS. & CO.

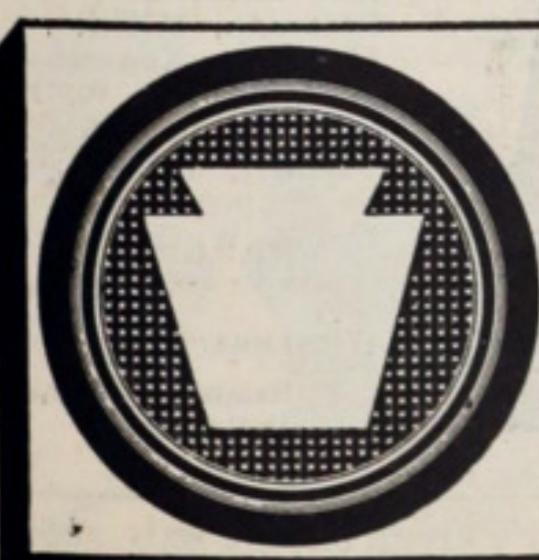
OHIO, Cor. Michigan St., BUFFALO, N.Y.

SHIP CHANDLERY, PAINTS, OILS,
AND VESSEL SUPPLIES.

THOS. DREIN & SON, TATNALL AND RAILROAD STS., WILMINGTON, DEL.



Builders of Metallic Life Boats and Rafts,
Yachts and Pleasure Boats, LifePreservers.
Outfit for Lake Steamers a Specialty.



ERIE RUBBER CO.
ERIE, PA.
Manufacturers of the
KEYSTONE MARINE VALVE
THESE
RED RUBBER VALVES
ARE THE
BEST AIR & FOOT VALVES MADE.
IF YOUR DEALER DOES NOT KEEP THEM,
WRITE DIRECT TO THE FACTORY.

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting
CHAINS.

Our DREDGE and CRANE CHAINS are made of IRON ROLLED
SPECIALY for that purpose. Send for Price List
J. B. CARR & CO., Manufacturers, TROY, NEW YORK.

YACHTING!

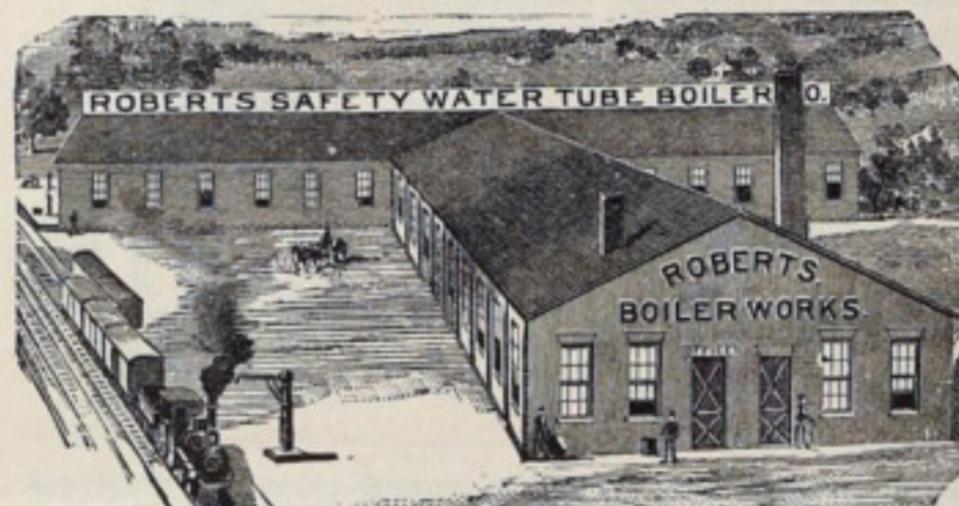
GO TO THE WORLD'S FAIR
WITH YOUR YACHT'S CREW UNIFORMED
BY

FRANK G. OVERBEKE,
TAILOR AND OUTFITTER,

FINELY ILLUSTRATED
CATALOGUE
ON APPLICATION.

112 Woodland Ave., CLEVELAND, O.

The Roberts Safety Water Tube Marine Boiler

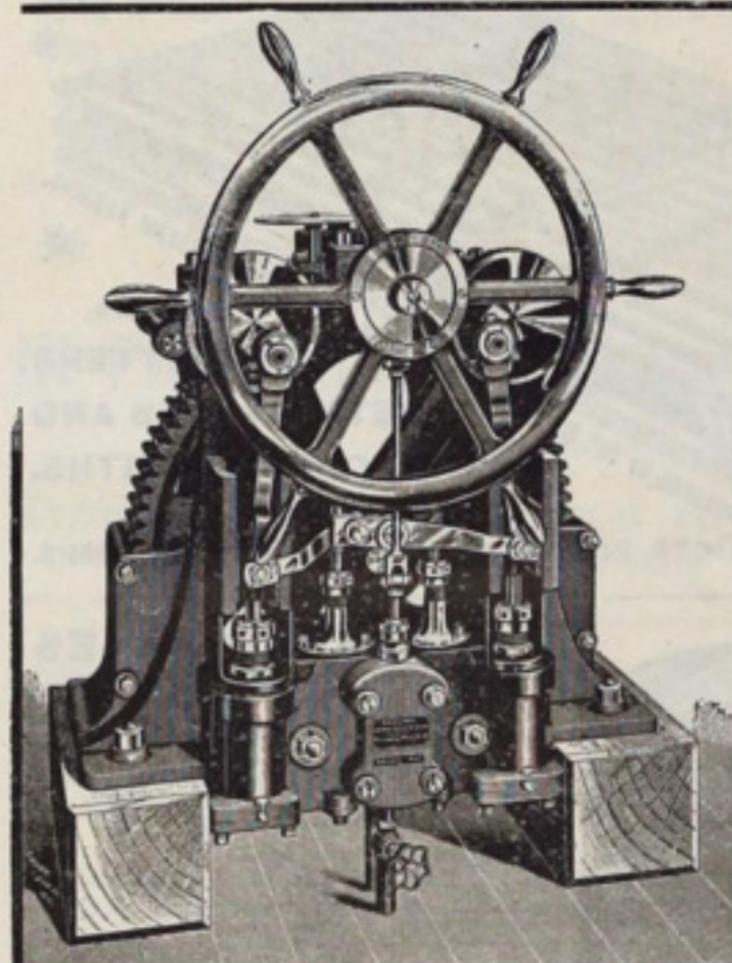


FOR
Yachts, Launches,
AND OTHER
Steamers.

OVER 500
IN USE.

Safe, Reliable, Simple,
Light Weight, No Shop
Repairs, Small Space.
Send for Illustrated
pamphlet and other
reading matter.

THE ROBERTS SAFETY WATER TUBE BOILER CO.
Works Covering 12,000 Square Feet of Ground at RED BANK, N.J.
18 Cortlandt Street, NEW YORK CITY.



No. 4 BECK
Steam Steering Gear.

Extracts from Letters.

"THE steering gears of the lakes."
Capt. Higbie, V. O. T. Co., Chicago.

"Cannot be excelled."
Capt. Cochran, Steamer Marion.

"Gives entire satisfaction."
Independent Tug Line, Chicago.

"Are giving excellent satisfaction."
Milwaukee Dredge Co.

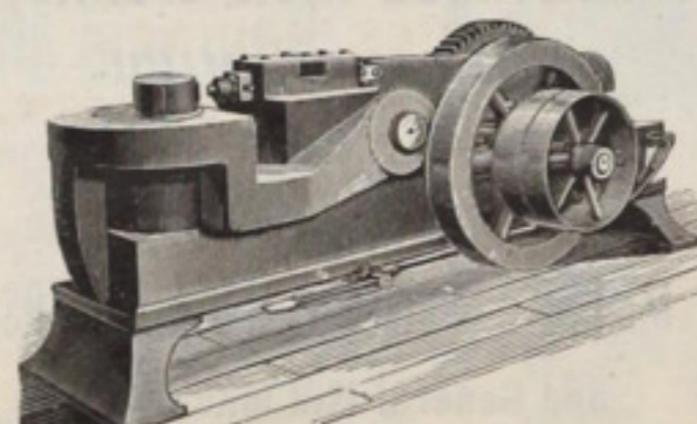
"The No. 4 Beck Steering Gear put in our steamer, Samuel Mather, has given excellent satisfaction."
W. L. Mahon, Mech'l Eng'r.
American Steel Barge Co.

PAWLING & HARNISCHFEGER,
156-168 Clinton Street,
MILWAUKEE, WIS.

The Excelsior Machine and Cleveland Punch and Shear Works Co.

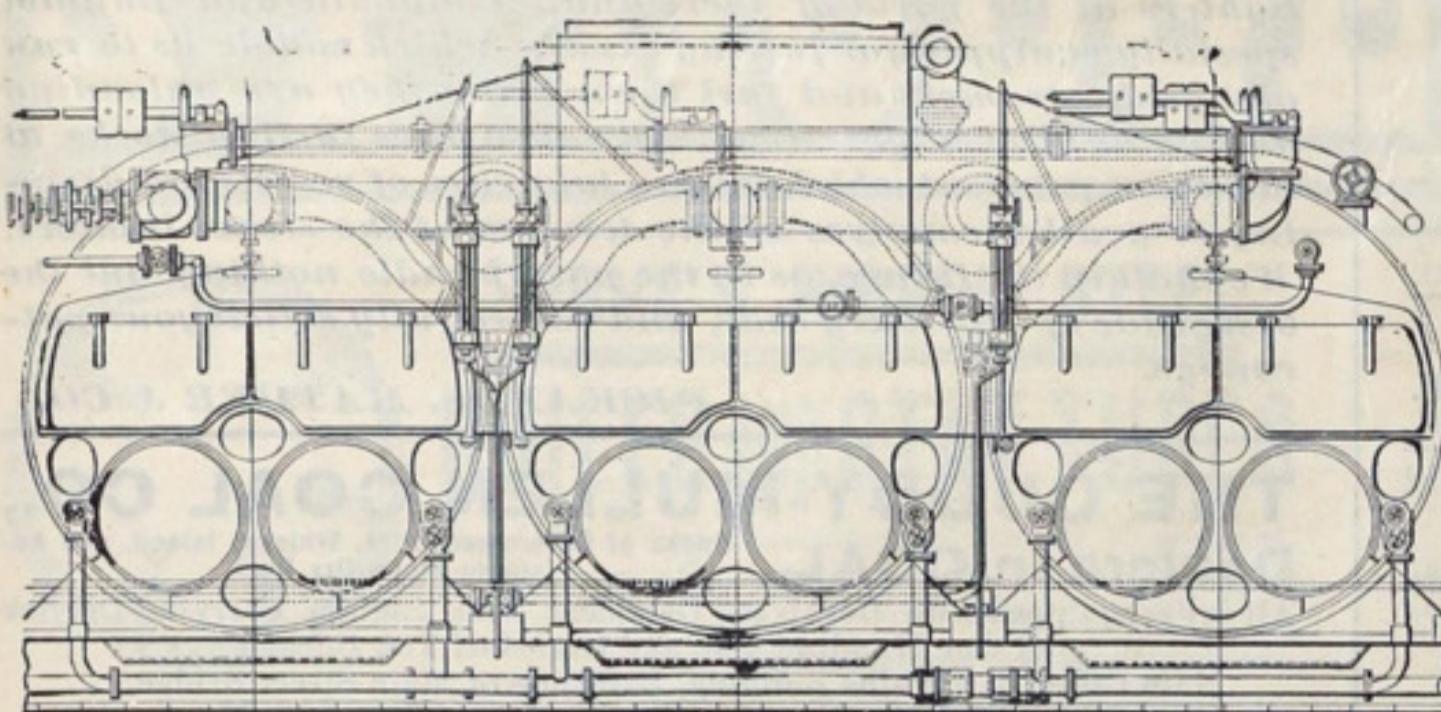
SUCCESSORS TO
LEICHTON & HATHAWAY.

Manufacturers of
Punches, Shears, Bending
Rolls, Rotary Planers, Over-
head & Post Drill Presses.



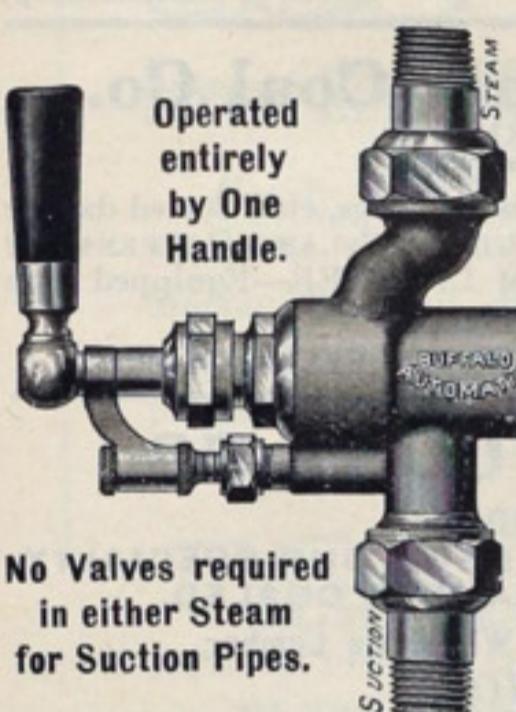
980 to 986 Hamilton St.,
CLEVELAND, OHIO.

LAKE ERIE BOILER WORKS, BUFFALO, N. Y.



THE BEST EQUIPPED PLANT
IN AMERICA

FOR THE MANUFACTURE OF
MODERN MARINE BOILERS.



THE BUFFALO AUTOMATIC. A GRADING INJECTOR.

The movement of the steam and water valves and their relative positions are such that the supply of water will always be in proportion to the supply of steam admitted to the jets. CAN BE GRADED to run continuously on any steam pressure from 20 to 140 lbs. Operated entirely by one handle, both in stopping and starting, as well as in grading the supply of steam and water. Eagle Injectors, Duplex Tube Scrapers, Cylinder Oil Pumps Improved Glass Oil Cups and Lubricators, Compression Grease Cups, Improved Ball Gauge Cocks, and other Steam Users' Specialties. Send for Catalogue, mentioning this paper.

No Valves required in either Steam or Suction Pipes.

SHERWOOD MFG. CO., (Sole Mfrs.) BUFFALO, N. Y.



STEP FORWARD
AND OWN AN INDICATOR
and know how to use it.
Send for circular.

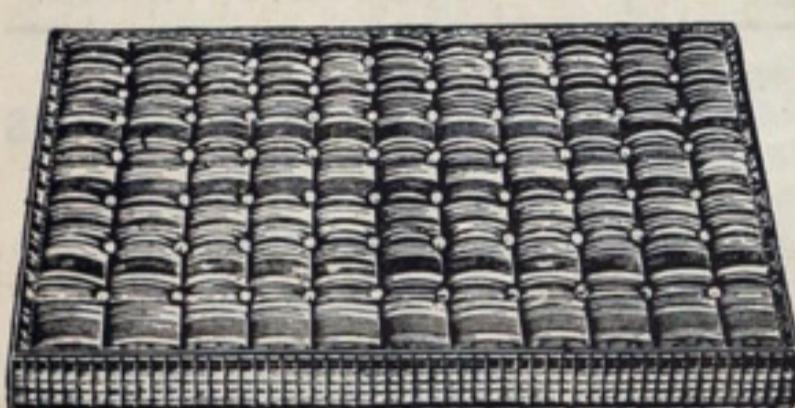
He is using the best till he has tried
EUREKA
PACKING
For Steam, Water and Air.
Send for Sample.

HINE & ROBERTSON, 40 Cortlandt St., N. Y.

NO MAN CAN SAFELY SAY

HAYES, HEIM & STACK,

MANUFACTURERS OF



**Mattresses,
Pillows, &c.**
Steam Boat and
Vessel Furnishing
a Specialty.
TELEPHONE 539.

68 and 70 East River St., Cleveland, Ohio.

T.S. & J.D. NEGUS

Have the largest and finest stock of Nautical Instruments and Charts in the United States.

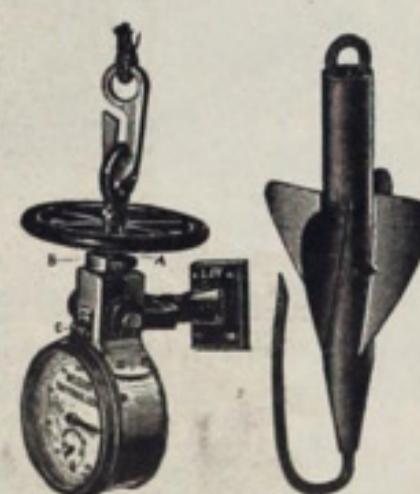
Estimates given for
Outfits of Steamers and
Pleasure Yachts.

Compass Adjusters.
Send for Catalogue
and Almanac.

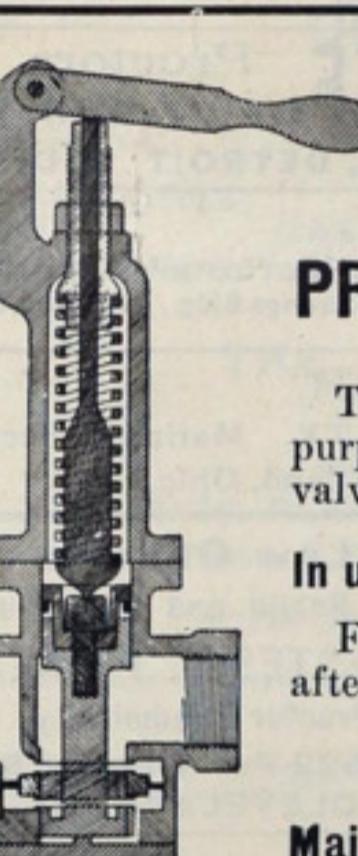
140 Water St.,
New York City.
Every attention given
to Trade orders.



Special Agents for the Celebrated Ritchie Compass.



Try the new NEGUS LOG.
Best in the World.



"It does its work"

BURTON'S PRESSURE REDUCING VALVE.

This cut shows the valve designed for marine purposes. The lever is for the purpose of forcing valve open if it should become dirty.

In use on twenty of the finest steel steamers.

For price list and letters telling how it works after two years' use, write

C. H. BURTON,
Main and Center Streets, CLEVELAND, O.

Ainsley's Engineers Manual of the Local Marine Board Examinations.

Complete in 2 Vols.....\$5.00

Reed's Engineers Hand-book to the Marine Board Examinations.

612 Pages, 36 Folding Plates, 8 vo. Cloth.....\$4.50

Triple and Quadruple Expansion Engines and Boilers and their Management.

With 59 Illustrations, by A. RITCHIE LEASK.....\$2.00

How to Run Engines and Boilers. By E. P. WATSON.....\$1.50

The Corliss Engine and Management. By HENTHORNE & THURBER.....\$1.00

SPON & CHAMBERLAIN, Publishers, 10 Cortlandt St., N. Y.

Illustrated and Descriptive Catalogue, 10 cents.

"The most perfect feed water heater and purifier we ever saw." —R. HAMMOND.

IN PRACTICAL USE ON 25 LAKE STEAMERS.

Every Purifier Warranted to Remove all Sediment or Scale-Forming Substance.

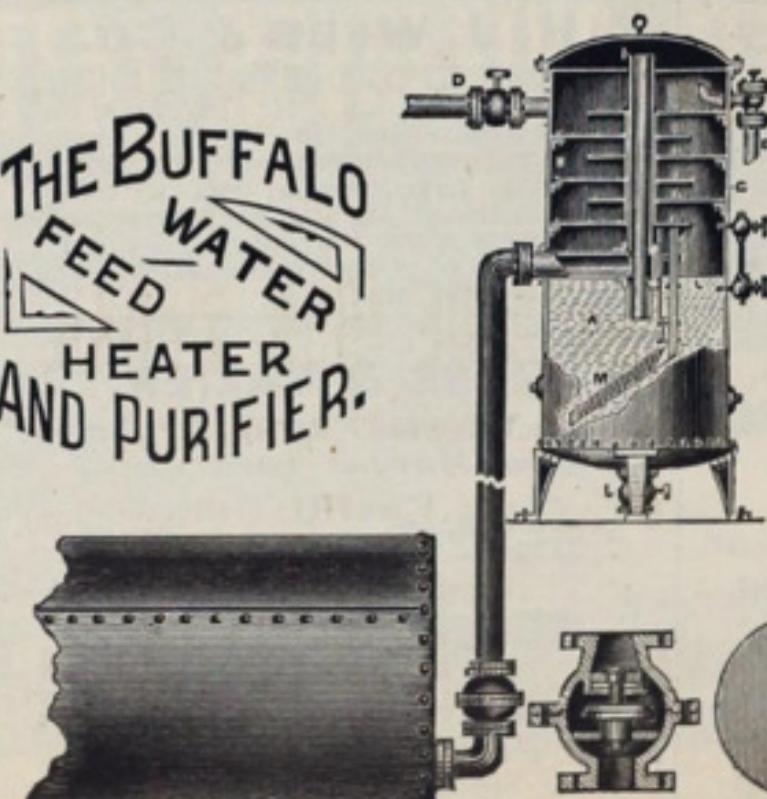
ROBERT LEARMONT PATENTEE,

200 BOUCK AVENUE,

BUFFALO, N. Y.

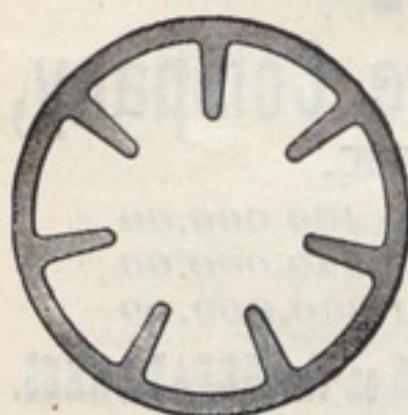
REFERENCES.

- A.—Settling chamber.
- B.—Boiler.
- C.—Feed pipe to boil
- D.—Steam pipe.
- E.—Water supply pipe.
- F.—Check valve.
- G.—Spray disks.
- H.—Spray chamber.
- I.—Equalizing tube.
- J.—Blow-off pipe.
- K.—Automatic shut-off valve.
- L.—Division plate.
- M.—Deflector and separator.



S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.
320 ATWATER STREET,
DETROIT, MICH.



SERVE'S RIBBED STEEL BOILER AND STAY TUBES

Show an average economy in fuel of 15 per cent. In steamers this means not only so much saving in cost of coal, but additional freight capacity.

Full Particulars on Application.

Purves' Ribbed Steel Boiler Furnace Flues.

Nearly 10,000 Purves' Ribbed Steel Furnace Flues, of which this cut is a section, are in use in Marine Boilers. Besides having greater strength to resist collapse than any other furnace made, they possess many additional advantages which we shall be happy to enumerate on application.

CHARLES W. WHITNEY,

Representing Messrs. JOHN WILLIAMS & CO., Liverpool, sole agents for the U. S. and Canada.
81 and 83 FULTON STREET, NEW YORK.

LIFE-SAVING MATTRESSES.



will not absorb moisture and cannot become infected with the germs of any contagious disease. Furthermore, they make the most comfortable bed in existence. Be sure you have your new vessels fitted entire with our goods. Write for catalogue and testimonial letters.

IMPORTANT.—We have just received official notice from the U. S. Government, that ships having our AIR MATTRESSES can carry so many less Life Preservers. Manufactured and sold only by

METROPOLITAN AIR GOODS CO., 7 Temple Place, Boston, Mass.

THE ONLY MATTRESS made that is essential for steamship use; fitted with life-cords, each mattress becomes a LIFE PRESERVER and will hold up twenty persons in the water. They are also especially adapted for Steamships, Yachts, etc., as they are always pure and clean, never need renovating,

~~~ HORACE SEE, ~~~

CONSULTING ENGINEER AND NAVAL ARCHITECT,  
ONE BROADWAY, NEW YORK.

### THE CONDIT FULLER CO.

CLEVELAND, OHIO.

**BAR IRON, SHEET IRON, PLATE IRON, PIC IRON,  
BOILER TUBES, BOILER RIVETS, PLATE STEEL,  
CLINCH RINGS, GAS PIPE, BOAT SPIKES, STEEL NAILS.**

Sales Agents of  
**THE CARBON STEEL CO.**

Manufacturers of  
**OPEN HEARTH STEEL,  
SHIP PLATES, BOILER PLATES,  
ARCHES and STRAPS FOR VESSELS A SPECIALTY.**

Write for Prices and List of Sizes.



"**WELLS LIGHT**"  
WALLWORK & WELLS' PATENTS.

**2000 CANDLE POWER!**

ESPECIALLY ADAPTED FOR

**Dry Docks and Night Loading.**

PORTABLE,  
ENTIRELY SELF-CONTAINED,  
REQUIRES NO OUTSIDE MOTIVE POWER,  
UNAFFECTED BY WEATHER,  
NO SPRAY, NO SMOKE, SAFE AND ECONOMICAL.  
IN USE ON 15 DRY DOCKS ON THE LAKES.

ALSO ADAPTED FOR  
**Iron and Steel Heating.**

For Hull and Boiler Plates,  
Tubes, Bending, Straightening  
and Laying Up Work.

For further particulars, address

**WILLIAM HALPIN,**

Successor to KEEGAN & HALPIN,

45 and 46 Washington St., NEW YORK.

## McMYLER MANUFACTURING CO., 180 COLUMBUS STREET, CLEVELAND, O.

SOLE MAKERS OF THE

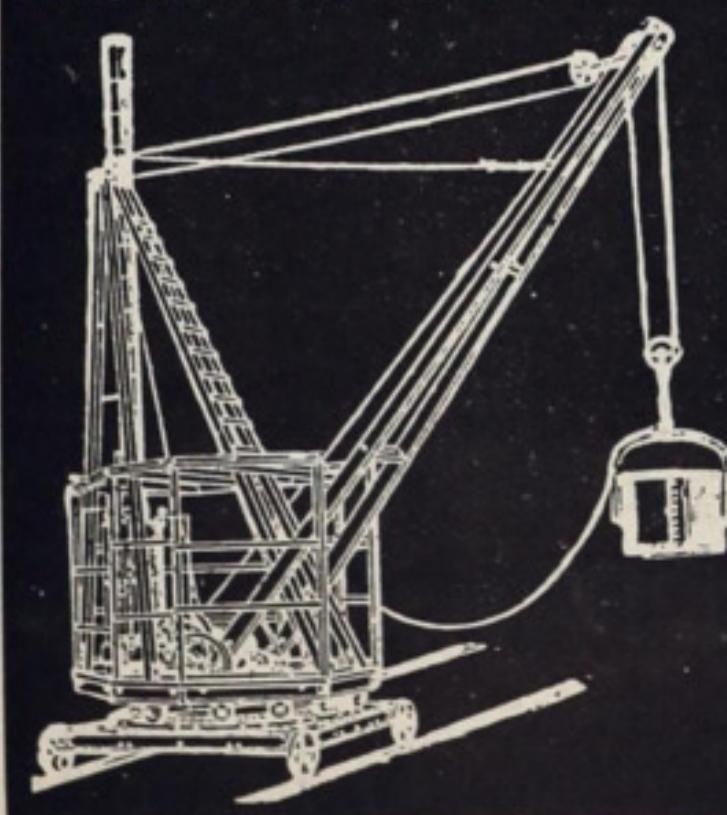
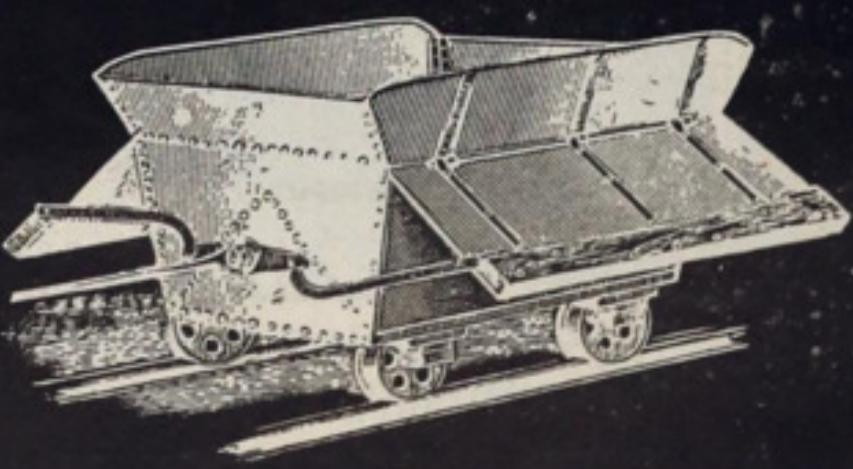
### McMYLER PATENT REVOLVING STEAM DERRICK

FOR HANDLING COAL, ORE AND COARSE FREIGHT  
OF ANY DESCRIPTION.

This Derrick can Lift Load, Alter the  
Radius of Boom, Swing in Either  
Direction at Will of Operator, and  
can Propel Itself on Track any De-  
sired Distance.

BUILT FOR ANY CAPACITY WANTED

BUILDERS OF  
**CONVEYORS, COAL BUCKETS, ORE  
BUCKETS AND DUMP CARS.**



# STERLING, WELCH & CO.

12 and 14 Euclid Ave., CLEVELAND, O.

BOAT FURNISHING A SPECIALTY.

CARPETS, OIL CLOTHS,  
CURTAINS, &c., &c.

Supplied at WHOLESALE RATES.



## The Martin-Barris Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR  
CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER  
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, Ohio.

## The United States Standard Register of Shipping.

Providing the only Standard Classification based on Construction Rules  
Designed for Lake Vessels.

Classed Vessels Receive the Lowest Rates of Insurance.

### SURVEYORS.

SINCLAIR STUART, Surveyor of Iron and Steel Construction and Engineer  
Surveyor.

GEORGE W. WILLIAMS, 211 King Street, West Bay City, Mich., Surveyor  
for District comprising Lakes Superior, Michigan and Huron and Lake Erie, as far East  
as, and including Cleveland, O.

EDWARD CASKIN, Potter Building, Main Street, Buffalo, N. Y., Surveyor for  
District comprising Lake Ontario and Lake Erie, as far West as, but not including  
Cleveland, O.

Application for survey of vessels and subscriptions to Register Book will be received  
by the surveyors or at the office of

The United States Standard Steamship Owners', Builders' & Underwriters' As'n, Ltd.  
Post Building, 16 and 18 Exchange Place, NEW YORK.

DAVID WHITNEY, JR., President.

THE

F. H. WHITNEY, Secretary

## MICHIGAN Fire and Marine Insurance Company, DETROIT, MICH.

|                         |               |
|-------------------------|---------------|
| CASH CAPITAL, - - - - - | \$ 400,000.00 |
| CASH ASSETS, - - - - -  | 840,000.00    |
| LOSSES PAID, - - - - -  | 1,800,000.00  |

THIS COMPANY DOES A GENERAL MARINE BUSINESS on the GREAT LAKES.  
AGENTS AT ALL PRINCIPAL LAKE PORTS.

INCORPORATED 1794.

## Insurance Company of North America.

|                                     |                 |
|-------------------------------------|-----------------|
| CAPITAL, Paid up in Cash, - - - - - | \$ 3,000,000.00 |
| ASSETS, . - - - - -                 | 9,744,513.70    |

CHARLES PLATT, President.

WILLIAM A. PLATT, Vice-President.

EUGENE L. ELLISON, 2nd Vice-President.

GREVILLE E. FRYER, Sec'y. & Treas.

JOHN H. ATWOOD, Assistant Secretary.

GEORGE L. McCURDY, Manager.

CHICAGO, ILLS.

## Lake Marine Department.

### ALMY'S PATENT

### SECTIONAL WATER

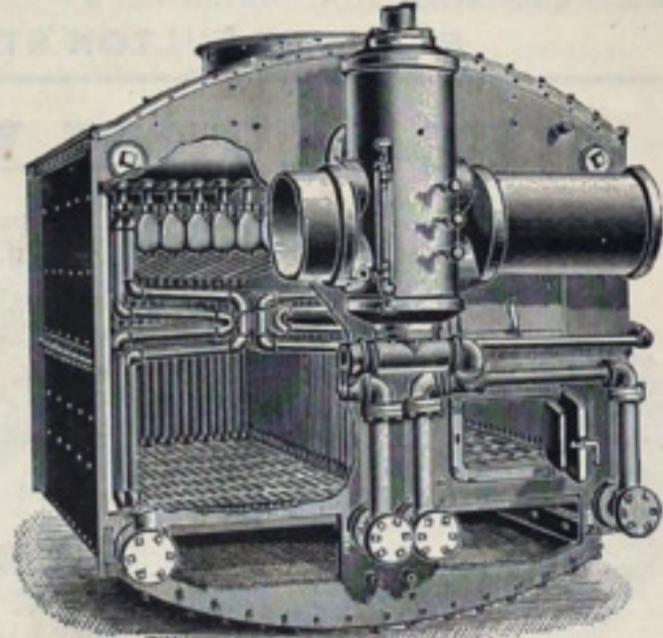
### TUBE BOILER.

The Most Efficient and Reliable Water  
Tube Boiler on the Market.  
is neither a copy nor an infringement  
of any other Boiler.

MANUFACTURED BY

The Almy Water Tube Boiler Co.

No. 47 CLIFFORD STREET,  
PROVIDENCE, R. I.



## W. W. LAWRENCE & CO.

PITTSBURGH, PA.,

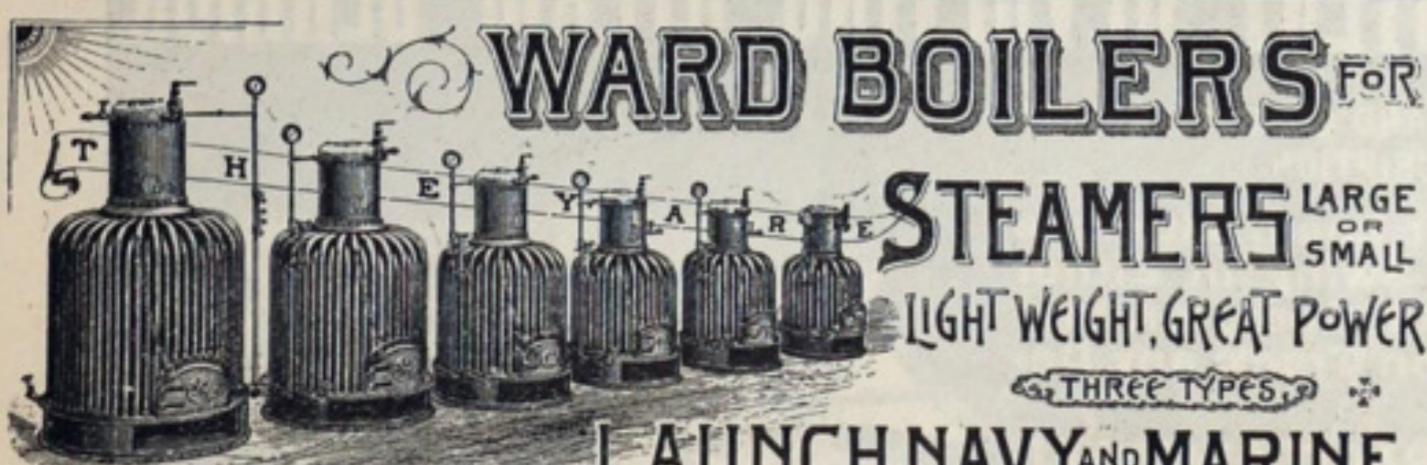
Solicit the Orders and inquiries of large buyers of

WHITE LEAD, LINSEED OIL, COLORS, READY-MIXED PAINTS, VARNISHES and BRUSHES.

Possessing unsurpassed facilities for manufacturing, we can  
sell the best Paints at prices ordinarily asked by others for  
inferior qualities.

Catalogues, Prices, Color Cards, etc. Free on Application.

OFFICE AND WORKS: Water Street, below Penn Ave.

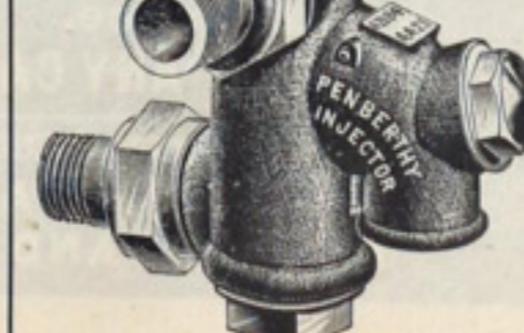


ADOPTED BY U. S. GOVERNMENT  
AFTER THE MOST EXHAUSTIVE COMPETITIVE TESTS. Correspondence Invited.

CHARLES WARD,  
CHARLESTON, KANAWHA CO., W. VA.

In Use  
on 600  
Lake  
Steamers.

THE BEST INJECTOR  
For Marine Use.  
THE PENBERTHY.



It has been tried by 70,000 Steam  
Users, and all are satisfied.

PENBERTHY INJECTOR CO.  
Detroit, Mich.